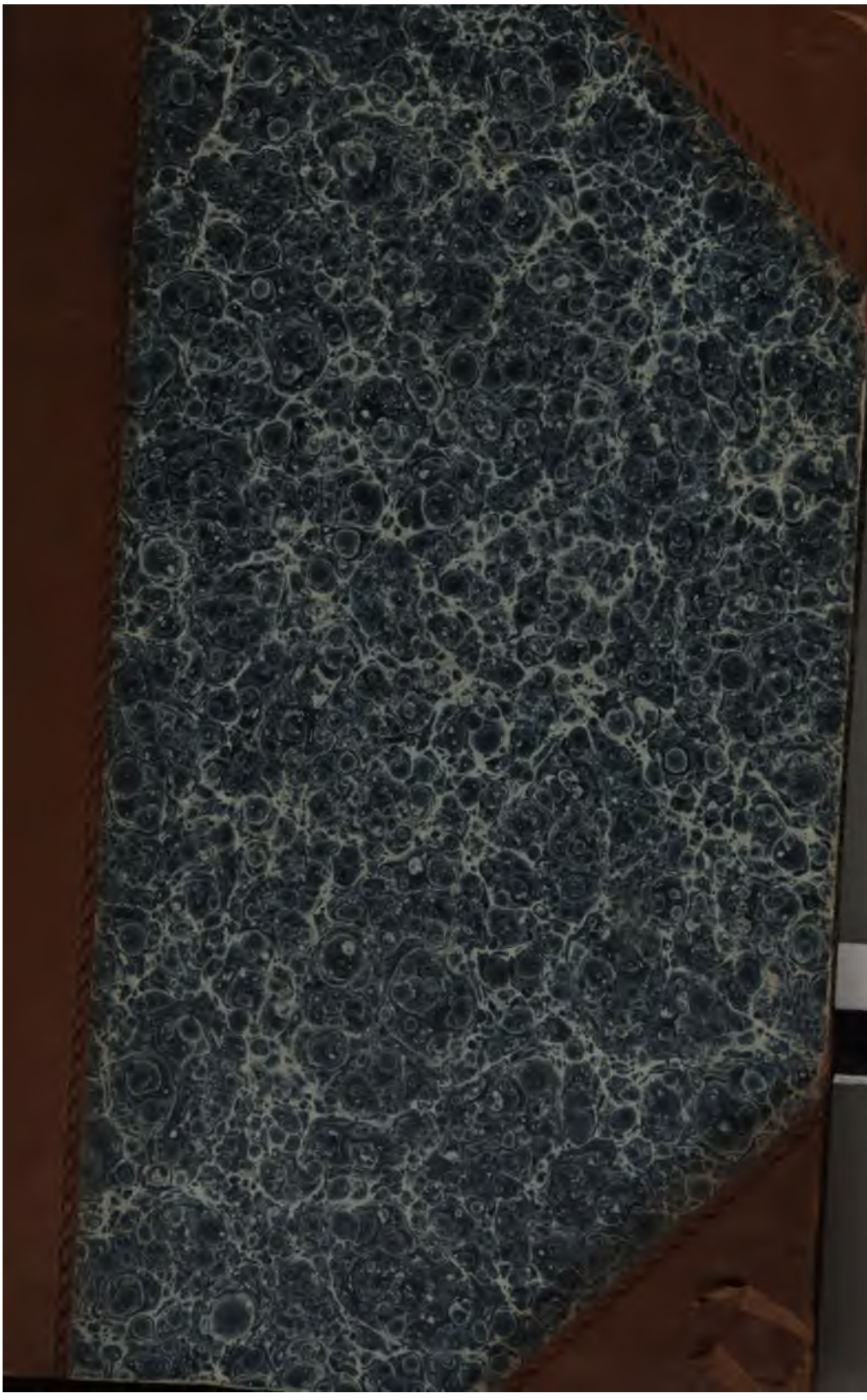

A TREATISE,

&c. &c.

ENTERED AT STATIONERS' HALL.

A

TREATISE

ON THE

INSECTS

MOST PREVALENT ON FRUIT TREES,

AND GARDEN PRODUCE,

GIVING

AN ACCOUNT OF THE DIFFERENT STATES THEY PASS THROUGH, THE DEPREDATIONS THEY COMMIT, AND RECIPES FOR THEIR DESTRUCTION, INCLUDING THE RECIPES OF VARIOUS AUTHORS, WITH REMARKS ON THEIR UTILITY;

ALSO,

A FEW HINTS ON THE CAUSES AND TREATMENT

OF

MILDEW AND CANKER

ON FRUIT TREES AND CUCUMBERS, &c. &c. &c.

BY JOSHUA MAJOR,

LANDSCAPE GARDENER.

LONDON:

LONGMAN, REES, ORME, BROWN, AND GREEN,

PATERNOSTER-ROW;

AND JOHN BAINES & CO., AND J. Y. KNIGHT, LEEDS.

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PREFACE.

HORTICULTURE, it will readily be allowed, is one of the most agreeable recreations, and one of the most useful arts, with which we are acquainted. Besides affording a healthful and rational amusement, it furnishes us with a large proportion both of the necessaries and luxuries of life. Nevertheless, the author of the following pages would not have thought himself justified in calling the attention of the public to a subject on which so much has already been written, had he not been conscious that the subject is of so extensive a nature that there are some branches of it which are not yet fully understood. Every one who has been engaged in Horticultural pursuits must be fully aware, from painful experience, that the Horticulturist has to struggle against almost innumerable enemies of the insect race, by which all is exertions are frequently rendered abortive. The principal object which the author of this work proposed to himself was to give such information as would enable the Horticulturist to free himself from the most formidable of his insect

enemies. With this object he has for several years devoted himself carefully to the observation of the habits and history of those animals, and has tried a great number of experiments for their destruction, the result of which he now lays before the public. He has thought it necessary to give a description of the appearance and habits of the different insects to be destroyed, as well as a short history of their different changes and processes, that every one may be able to detect them, and may understand at what times the Recipes can be applied with effect, and when, from the state of the insect, they and all other remedies will be quite useless—a point of great importance, but one which has been hitherto altogether neglected. If the Recipes are found to be effectual, he will have effected all that he intended; he has not been in the habit of writing, but ventures to hope that the usefulness of the information which he communicates, will apologize for the defects of the style and composition.

KNOSTROP, NEAR LEEDS,
JAN. 1, 1829.

INDEX.

APPLE TREE.

ERRATA.

Page 29, line 3—instead of "those" read "the" and after little knots, read "they produce."

Page 35, line 1—instead of "the 4 lbs." read "4 lbs."

Page 34, line 5—Instead of "fresh oil" read "fish oil."

Page 76, line 6.—Omit the words "the first time over."

Page 88, line 2 from the bottom—Read "melons" for "mellow."

Page 139, line 2 from the bottom—Read "Borer," instead of "Bore."

Page 171, line 9—Read "into" instead of "of."

Page 181, line 19—Read "Seasons" instead of "beans."

Page 225, line 16 Read "casts" instead of "coats."

Page 235, line 11—Omit "grass."

Page 242, line 10—Read "*un*movable plants" instead of "on moveable plants."

Page 273, line 3 from the bottom—After "same" read "time.'

Page 276, line 4 from the bottom—Instead of "if" read "of.'

A TREATISE,

&c.

APPLE TREE.

PLANT LICE *(Aphides)*.—The Aphides are an extensive genus, and owing to their great multitudes prove one of the most pernicious tribes of the Insect race to the vegetable kingdom. They are commonly known by the terms of Green Fly, Smother Fly, and sometimes, and more properly, Plant Lice. There are two species which appear to choose the Apple Tree as their principal support. The buds and leaves and young branches appear to afford delicious food to one, while the other decidedly prefers the trunk and branches.

I will commence with the former one, by giving as clear a description as I am able of some of its different processes; and as the species are so numerous and the difference between them so trifling, that no one but an Entymologist could distinguish those differences, rather than err in not giving this species its proper name, and as it is of little moment, I shall decline naming it. It makes its appearance upon the buds as soon as they exhibit

the least verdure, and on some kind of apple trees before the bud has at all burst its exterior cuticle. It is very remarkable, but quite certain, that the first generation of this species is produced from an egg, while all the succeeding generations, which are many, both in their larvæ and perfect state, are viviparous. The eggs are deposited in the month of October on the spurs and branches of the tree, where, and in which state, they withstand the winter months, without sustaining the least injury. As the reviving spring approaches to bring vegetation into existence, it appears to be provided that the same cause should move the ova, to produce those little animals, at the same time. They immediately commence feeding upon the bursting buds; but it does not appear that so much injury is done to the buds as we might suppose from the multiplicity of eggs there sometimes are till the succeeding brood, perhaps owing to the cold which mostly prevails early in the spring months, and by which they are caused to be chiefly torpid. The next brood, however, which is viviparously produced from them in three or four weeks after quitting the embryo, when the weather becomes more exhilerating, soon furnishes the underside of the leaves with a multitudinous progeny, and goes on increasing so rapidly that in a few days the insects have to enlarge their possessions, which they do even so as to envelop the whole end of the young shoots, and so as to have to rest one upon another. So productive is this tribe of insects that KIRBY in-

forms us, that REAUMUR has proved that by some species of this genus, in "five generations, one *Aphis* may be progenitor of 5,900,900,000 descendants, and it is supposed that in one year there may be twenty generations." He also observes, that at the time of emigration, "these great enemies of the world are sometimes so numerous as to darken the air." This is extremely astonishing (yet I would not doubt the authenticity of the assertion), for although I never saw them so numerous as to darken the air, yet I remember seeing, in this neighbourhood, in the month of September, I believe in the year 1819, the species which infest the apple tree alight in clouds, so as almost to cover every kind of tree or plant they came in contact with. It is remarkable, but I believe always the case, that the apple tree is quite free from this insect from the middle of June to the month of September, at which time it again becomes infested with the perfect insect. They then viviparously establish their offspring, and this generation, in its imperfect state, quits the leaves and deposits eggs numerously on the spurs and branches of the tree, and then, like all the preceding generations, after establishing its progeny, soon dies. Nature is wonderfully displayed and the Being of an allwise instructor and creator illustriously exhibited by the instinct of these little animals in choosing to establish their ova on the branches and not on the leaves, on which they had recently been

feeding, as though they were told that the one is a more sure foundation than the other, and that if they did not quit their old habitation it would not afford protection to their progeny, which with it must be brought to the ground and perish. The eggs are completely black, of an oval shape, and may be pretty well discerned by the naked eye. The larvæ when first produced are of a dark green, with a black head and legs. The male and female in their perfect state are furnished with fine erect wings, nearly three times the length of their body, which assist them to emigrate into different parts. The last emigration takes place in September, the emago or perfect insect, survives a few weeks to establish her progeny, and then immediately dies.

It is supposed, generally, that the Aphides are brought into this country in the beginning of spring months, by the east winds; but this is quite erroneous, as evidently appears from the circumstance that those which make their appearance first are not in their perfect state. The wind must be strong indeed to bring them from any distance when they are not furnished with wings. It is true that through the course of the summer and autumn months, at the time of emigration, the perfect insects are taken to greater or lesser distances, according to the power of the wind; but those which are seen so early in the spring upon the apple tree, are produced from eggs. Other species that were in existence in the autumn months will also be found on their favourite plants, and, after lying

dormant through the winter, again resume their post at the approach of the reviving spring.

The depredations the *Aphides* infecting the apple tree commit are sometimes extensive. The leaves and young shoots they infest are not consumed by them, but by perpetually pumping out the sap, the leaves and ends of the young shoots become so crippled and so much exhausted, that if they survive at all, their progress is prevented for that season. When apple trees are much infested, their appearance becomes unsightly, and the fruit is small, ill-flavoured and so dirty with the fluid they eject, that it is almost useless.

I would remark here, that this species, with most others of its genus, is the cause of that saccharine substance which is so generally seen on the upper surface of the leaves of the trees and plants, and which is the cause of so many false notions respecting the Honey Fall, a name given no doubt on account of the sweetness of the fluid. Many preposterous ideas have long existed, and still exist, respecting it, not among the illiterate only, but even among the learned. Hence we find that PLINY, the Roman Naturalist, has been at a loss for its real source. He says " I am at a loss whether I shall call it the sweet of the heavens, the saliva of the stars, or a liquid produced by the purgation of the air!!!" and it is not uncommon for persons at this day to make similar remarks to those of PLINY. This was exemplified in my presence very lately by an experienced Horticul[illegible]

who contended strongly, or rather obstinately, that the Honey Dew was not produced from the insect, but fell from the heavens, the atmosphere, or he did not know where; and even some modern writers appear equally ignorant on this matter. MILLAR shows (as we find in a work originally written by BRADLEY), that "the long continuing dry easterly winds affect the young and tender leaves, whose perspiring matter becomes thickened and glutinous, so as closely to adhere to the surface of the leaves, and becomes a proper nutriment for insects, which are always found preying upon the leaves and tender branches of fruit trees when this sort of blight appears, though it be not the insects, which are the first cause." FORSYTH does not consider it to be caused by insects, as we find he gives separate descriptions for Aphides and Honey Dew, and recommends different remedies for their removal. WEIGHTON in his communication to the Caledonian Horticultural Society, says "a few days after the Honey Dew comes on, the green and blue fly appears," and farther on in the same paper, he observes "it is imagined by some that this glutinous matter is perspired by the tree, and that the insects come to feed," and adds "this is my opinion." HARRISON shows that he does not suppose it to be produced by insects. If he had entertained a different opinion, he would not have had two distinct descriptions, but have connected the account of the *Aphides* and Honey Dew together. Washing with

pure water, as he recommends, would then have been of some use after the insects had been destroyed. "This," meaning the Honey Dew, "is generally known, being a clammy substance which coagulates upon the leaves and wood of trees. It so much affects them sometimes, as to close up not only the pores of the leaves, but the wood also in a great measure. A speedy removal is highly necessary, as the growth of the tree is frequently stopped by it. This may be done by frequently washing with pure water." Many other similar accounts might be enumerated, but those are sufficient to show the existence of this erroneous opinion. If those of our friends who still waver in their opinion respecting the cause of this clammy substance, will take the trouble to examine the underside of the leaves and the ends of the young shoots which are hanging immediately over those shining leaves, they will be sure to find one or other species of the *Aphides* there residing; while those parts of the tree or plant where those insects do not exist, will be quite free from Honey Dew. To prove it is not produced from the atmosphere, we need only consider for a moment that were the Honey Dew to fall from the heavens, it would be impossible for one part of the tree to escape the fluid and the other part to retain it, or for one kind of tree to be completely covered with it, while trees of another kind shall be closely connected, and yet quite free. The sycamore, the gooseberry and

currant, are generally infested with this glutinous substance, while the rhododendrons, laurels, and many other plants, are never at all annoyed. Here I am reminded, that when walking along the side of a plantation which stretched its branches over the causeway, I suddenly cast my eye upon a portion of the causeway that was spotted over as though a gentle shower of rain had commenced, but on looking up nothing like rain appeared; while gazing I was not long at a loss in finding out the cloud from whence this dew had issued, for immediately over me were the sycamore branches inhabited by myriads of these animals, and for the whole length of the plantation I had no need to look up to find the sycamore, for under the whole, as they came in rotation, the above marks were exhibited. Plants even when protected by glass, become covered with this saccharine fluid; but if it were produced from the heavens, it would be impossible to suppose that it would fall through the glass and light on the plants. If the Honey Fall is produced from the perspiration of some part of the tree, as MILLAR and others assert, one would naturally suppose the *Aphides* would be found on the upper surface of the leaves where this fluid generally appears, a circumstance which never happens except by single insects travelling in search of a proper station. Their habitations are chiefly on the underside of the leaves, or upon the ends of the young shoots where the Honey Fall is seldom to be found, or at least to no great

extent, although from thence they derive their whole support. The observer will readily perceive that the Honey Dew is not gathered from the surface of the leaves, as supposed, but that the little animals evidently labour much in extracting the juices from the tree or plant for their sustenance, and at different intervals, by a similar motion, they may be seen to eject this excrementitious substance, which I do not hesitate to affirm is the real cause of the Honey Fall, and that it is neither produced from the heavens, the air, nor the exudation of vegetation: I do not deny that a glutinous or clammy exudation does transpire from different trees and plants, but I do say that it is natural to those plants on which it is found, and mostly indicates health rather than disease, which is plainly represented by the Cistuses, the Acacia Gluttonosa, or Clammy Acacia, the Horse Chesnut, the Balsam Poplar, the Tobacco, and several other plants.

The secretion of some other insects produces a similar effect to the *Aphides*, but not nearly so abundantly, especially some species of the *Cocci*, as will be seen on the various plants protected by glass.

It has frequently been inquired why the *Aphides* prevail more some years than others, and it will afford me much pleasure if the following observations on that subject prove at all satisfactory: it is generally supposed that the weather has a ruling power over these little animals, but

this is not to such a degree as may be imagined, as will appear from the following remarks :—On examining the *Aphides* issuing from the eggs, on the Apple trees, in the spring of the year 1823, none of the eggs appeared to have perished, although the frosts had been severe the preceding winter, about the middle of which we had it constant or nearly so for a period of five weeks; there was also much snow and rain through the winter, and although the summer months in the same year proved uncommonly wet, this species, and others of the same genus, prevailed extensively in these parts of the country, and I believe pretty generally throughout the kingdom. Dry weather does not destroy or hinder the increase of these insects, but, on the contrary, proves more conducive to their increase than wet dull weather; this was, it is true, not generally exemplified in the summer of 1826, for although it will be remembered, that it was remarkable for heat and drought, nevertheless those insects did not generally prevail to any serious degree. For example, the hops, which are often much annoyed by them, were pretty free from their attacks; fruit trees and plants also generally escaped without much injury; but the Brassica tribe were much infested throughout the summer months. Why they prevail at one time more than another may be partly accounted for in this way. It will be allowed by all that the Almighty uses various means to put us in remembrance of his omnipotence, his omniscience, his wrath, and his

mercies, and it is his will no doubt, that those his armies should be let loose as one of the means to accomplish his wise purposes. When the Creator sees it good to stop their depredations how miraculously does he raise up other armies calculated to subdue these depredators. This was astonishingly exhibited in the year 1826 by the Lady-bird *(Coccinella.)* Throughout the greatest part of the spring months most species of the *Aphides* made their appearance, and so rapid was their increase that symptoms of serious injury to the vegetable kingdom appeared to be advancing most rapidly, but fortunately nature commanded those little warriors to prepare for and enter the field of war, which they courageously obeyed, and made their overwhelming attacks upon the enemy about the middle of May, and so effectually repulsed them, that scarcely one in the whole could be found by the middle of June, either living or dead, although a short time before so formidable and so multitudinous were these troops, that we could not so much as suppose there was any way of escape. These animals, while in the larvæ or imperfect state, are nearly black; when full grown, they are about half an inch long, about the size, or rather larger than the body of a house fly without its wings, and obtuse at the head, gradually tapering to a point at its lower extremity. They have numerous annular joints quite round the body, the whole body has a rough or knotted appearance, and is fur-

nished with six black legs; they are produced from cylindrical formed buff-coloured eggs. These eggs are deposited by the perfect insect in groups of from a few in number to fifty and upwards, generally on the under-side of leaves, and sometimes on the branches; in the course of a few days they send forth the young, which, after feeding a few weeks, are transformed into the perfect insect. When perfect their shape is very regular, and nearly the form of an oval. The testaceous wing cases of the most common kind are red, spotted on each side with three black spots, and the head, thorax, body, and feet black. There are others with only one spot on each wing case; and also others, with bright black wing cases, each of which are spotted with three red spots, in this state they feed upon the *Aphides*, but not so ravenously as when in the immature or larvæ state. There are several broods in one year, the first of which is produced from the egg of the perfect insect about the latter end of May. The perfect insect of one or other of these broods may be met with in search of its prey through the greatest part of the spring, summer, and autumn months, providing the weather proves favourable: its retreat during the winter months is mostly under rough bark of trees, among fallen leaves, or thickets of plants, and it resumes its pursuits in the spring. This little animal leads me to observe how essential it is that we should acquaint ourselves as much as

possible with the insect race, that we may know the difference betwixt those that befriend us and those that do not.

I remember in the year 1823, in the neighbourhood of Pontefract, being much struck with the singular appearance of an orchard of Apple trees being stripped of their exterior bark, and on inquiring why they were thus treated, the principal reply was, that it was of great service in destroying insects, for, says the person, "When taking of the bark, I found great quantities of them lodged under it," from which observation I found that he was injuring his particular friend, the Lady-bird, and not his enemy, as he supposed.

Another destroyer of the *Aphides* is the larvæ of the Fly (I believe *Musca Pyrastri)* which is frequently in hot days seen steadily hovering above a particular spot, as though it was suspended in the air, alternately darting horizontally and in other directions in the air. It appears that the fly deposits her eggs among the *Aphis,* to which she is no doubt first attracted to feed on the saccarine fluid they eject. They do not of themselves destroy the *Aphides,* but the larvae they produce commence their ravenous pursuits very soon after coming into existence. The eruca or larvæ is uncommonly soft, and faintly variegated; the head and hinder part are acute; the whole form is much that of a leech in miniature.

It is also said that ants are great enemies to the *Aphides.* I cannot be positive respecting this.

I have been very minute in watching the proceedings of the ants among them, but never found one *Aphis* destroyed by them. Their attendance appeared to be only for the purpose of procuring the excrementitious substance produced by the *Aphides*; and I have observed when this has not been sufficient, that the ants have pushed them about, and caused them to eject the fluid, which they have immediately and eagerly consumed. Therefore, if the ants are of no farther use than to cleanse, or partly so, the foliage of this glutinous matter, the good they do will not compensate for the evil produced by disordering the ground and plants where they reside; and of course they will be better destroyed than otherwise, as the leaves can be cleansed with weak soap water. Several kinds of birds are of great service in destroying the different species of the *Aphides*, but their services are rendered more effectual some years than others, according to the superfluity or scantiness of the different kinds of provisions they resort to or feed upon, and to the number of birds. These, with the foregoing remarks, are the principal reasons I can give, to show why they prevail more one year than another, and in some situations, while others are free.

To save repetition, before I proceed to show the manner of destroying these insects, I would just observe, that they, as well as most kinds of insects, breed rapidly, so that should even a few escape destruction, vegetation will soon be

again overrun by them, and some careless or indifferent persons may think that the different recipes will be of little or no use. But, before coming to so hasty a decision, I would desire them to try the recipes effectually upon a small scale. Let them examine the trees before the application, and frequently after; and let those kinds of insects which are not discernible with the naked eye, be observed through a good microscope, and it will be readily perceived whether the remedies are effectual. Notwithstanding the recipes communicated by me, or by others, several insects will no doubt escape the application of the mixture, either by being concealed in crevices of the trees, in walls, in the earth, or even on the leaves, as well as by being in the embryo state; it of course requires much care and diligence to clear a garden much infested with them.

That this may be effectually done, walls must be kept well pointed, or they otherwise would harbour both the insects and their eggs; the removal of shreds of wall trees is also very essential, and those intended to be used again should be immersed a few minutes in boiling water, for the destruction of the eggs and insects. The refuse also should be burned, or else put in boiling water; and as some eggs and insects may fall in taking off the shreds, it will be necessary to water the ground well with boiling water, or spread a sheet, to catch the insects, previous to the performance.

I trust my readers will not be disappointed when I say, that no merit will be due to my recipes for promoting the health of the trees to which they are applied, further than by preventing those depredations which are the cause of the destruction of health and beauty. I must beg to differ with those authors who establish to their remedies such merits as that when they are applied three or four months previous to the circulation of the sap, supposing it to blend with it, and be transmitted to various parts of the tree, when the sap is in motion, and promote health, for it certainly appears to me to be stepping from the common course of nature, to suppose any chemical preparation is required to be applied on the branches of trees, to add purity and efficacy to their juices; in such cases, if we were occasionally to apply pure or rain water, we should be more likely to render the tree much more healthy. Should a tree be hide-bound, or in other words confined in its bark, then probably it might be of service to assist it to extend and shed off the useless or rough bark. Neither can I persuade myself that any ingredient which will destroy the eggs of insects, as numerous authors assert, can be used without injuring vegetation very materially; for although we find oil destructive to insects, spirits of turpentine, and I believe most kinds of spirits, will kill insects in general, but not the eggs, neither can oil or spirits be

applied without injury to vegetation, especially to the buds of all kinds of trees and plants.

FOR THE DESTRUCTION OF THE APHIS, it will be proper to look over the trees as soon as the buds begin to open out, or rather about the time when the corticated envelopment has burst which contains the flowers, and while the petels are still unexpanded. By the time that the petels expand, or perhaps before, the whole of the insects will have left the egg. The preparation (No. 1) may be applied, as warm as the hand can be just borne in it, with the engine, by pressing upon the pipe with the fore finger, and suffering it to escape like fine rain, so that the tree may be wet all over, without much waste. At the same time, it should be applied with as much force as possible, which assists it in spreading and entering into the crevices of walls and trees. It will be of farther advantage to use a whisk, beating it carefully upwards to save the liquid, and that the insects on the under sides of the leaves, may receive it more effectually. Care should be taken not to apply it in the evenings, as, at this time of the year, white frosts are very general, and the wet would considerably assist the frost in destroying the bursting buds. The best time is from five o'clock to eight in a morning, which gives time for the trees to get moderately dry before the sun becomes powerful, which might otherwise scorch the leaves or tender buds. As some of the leaves undoubtedly will escape this operation, they should be frequently

looked over, to see if there be any need of the application being repeated. A very proper time also for the destruction of these insects is, from the beginning to the middle of October, when they will be found on the underside of the leaves, preparatory to depositing their eggs. FORSYTH, and others who have copied his directions, recommend lime, for the destruction of the green Fly, to be dashed over the tree, or lime water forced upon it by the engine, *(see his Directions quoted on Plumbs)* both of which appear to be of no use. The former also gives the tree a disagreeable appearance, on which account it should be omitted, especially when the leaves are expanded. Mr. Harrison recommends an ancient practice, performed by many old gardeners with good success, but the operation is tedious, viz. that of snuff being dusted on the infested parts, also the trees being fumigated. Mr. BEATTIE recommends lime-water, the same as Mr. FORSYTH, with an addition of half-a-spoonful of soda, namely—"One peck of unslacked lime, to be put into a hogshead of water; let it stand twenty-four hours, then draw it off, and add half a pound of soda to the hogshead of water. Twice or thrice will destroy the vermin."

APHIS LANEGERA, another species of this tribe. *Aphis Lanegera,* commonly called the American Bug or Blight, is one of the greatest pests the apple tree is subject to: it is much about the same size of the one described above, and of a

brown colour, and its existence will be known from the downy or cotton-like appearance which at the time of feeding transpires from the pores of its body; so deceptive is this envelopment which conceals it, that one would not imagine that there was any living inhabitant.

It appears from an account given by Sir JOSEPH BANKS, that it was first introduced into this country about the year 1796 or 7 from South America, with some apple trees imported from that country. It was at first confined to the metropolis, but now prevails more or less all over the kingdom. It makes its appearance early or late in the spring, according to the severity or mildness of the weather. In short, mild winters, in well sheltered gardens, some will be found to feed, and will become general upon the trunks of the trees, and proceed to attack the smaller branches as the weather becomes less prejudicial to them; there they will feed till about July, when the greatest portion of them leave the trees, and I believe enter the earth and perish. Some of the latter broods it is probable emigrate to other parts, but I believe not by the aid of wings, like others of the same genus; for, after repeated investigations I have not found them at any time in a winged state, and therefore I conclude that they must pursue their natural course on foot upon the surface of the ground. In course of the autumn months the trees again become numerously infested by them. I have not been less minute to ascertain whether or no these animals are

not sometimes viviparous, and at other times oviparous, but never found at any time the ova, and it is probable that those who assert that they are produced in the spring from an egg may have formed a misconception by the eggs of other insects of the same genus, which are sometimes deposited in parts where those insects inadvertently choose for their residence. It is, however, certain that the latter brood retires in crevices and under rugged barks of the trees, or holes in the earth for protection, and remain torpid through the winter. I remember on my attendance to design the alterations of a gentleman's pleasure grounds, on the 25th October, 1826, on a fine day, after a night of frost, seeing incalculable numbers of young ones assembled in groups on the tops of the espalier posts, as though they had been apprised of their danger, and had assembled to take into consideration the best steps to be taken to render them secure against the approaching winter. Those which survive the winter months resume feeding generally first on the trunk of the tree, as it mostly falls first in their way when leaving their concealments. Should only a few appear at first, so multifarious are they, that the trees which are occupied by them, will in a few weeks be completely overrun by their progeny. This species not only gives an unsightly appearance, but from continually drawing the sap out of the trunk and branches, tends greatly to injure the health of the tree. This frequently prevails to such a degree

that there is not a sufficiency of sap to send forth any young shoots at all. I remember being asked if I did not think that those little knots contained the eggs of the Bug. The question may appear to some very ridiculous, but probably it may not appear so much so when we consider similar cases. The little lumps on leaves, branches, and bulbous roots, commonly called galls, are actually inhabited by living animals. But in the case in question these knots are excrescences caused or produced by nature in repairing the damages done by these animals lacerating while labouring for their support.

Apples, and various sorts of Crabs, appear to be the only sort of trees or plants they inhabit. MR. SALISBURY represents the larvæ as feeding on the roots. I have never found them there, though I have frequently searched for them. There is a species (the larvæ) of the same genus which often attacks the roots of various trees and plants, and which also transpires a similar substance to that of the *Aphis Lanegera,* which may possibly have been taken for it. HARRISON also speaks of their feeding upon the roots, and furnishes a plan for their destruction while in that situation. Mr. SALISBURY also gives a representation of the winged or perfect insect, which he supposes to be the male. This I would not presume to dispute, although there must only be few in this state, or otherwise I have strangely mismanaged my investigations.

These animals have been the cause of great injury, and much inquiry for some effectual remedy. I have spared no pains to accomplish that object. I trust what I have here laid down for their eradication will prove effectual and satisfactory. For their destruction the mixture No. 3 should be brushed over the dwarf and trained trees with a painter's brush, early in the spring, when the *Aphis* makes its first appearance, which will be readily known by the cotton-like materials it produces. Should spring application be neglected, the operation may be repeated with safety at any time of the year, except when the bloom is expanded, which would be partly injured by its operation. If the application should be postponed till the insects become numerous it will be necessary to perform it at least twice in three or four days, as when the insects are crowded the mixture may not reach those lying underneath. In performing the operation many will fall to the ground, and again ascend the tree, and therefore a careful repetition with the engine or the brush in a few days after the first, will be of essential service. As the insects which infest the trees at the back end of the year are also those which make their appearance first in the spring, the latter end of September, or the beginning of October, will be a time equally proper to apply the mixture. In all cases let the mixture be so frequently and so carefully applied, that it may enter the cracks and joints of espalier rails, and of the walls

where the apple trees are trained, as some insects may be there lodged. It would be tedious to use the brush for standard or large trees, but much good might be done by the following practice :—Should the application of the mixture be deferred till the insect becomes plentiful, it would be well in the first place to force spring or soft water copiously over the trees with the engine, to break or dislodge their secretions, that the mixture may be forced more effectually amongst them with less waste. The mixture must be then applied with the engine as before-mentioned, and in two or three days after the operation must be repeated. To make the mixture more powerful, one gill of train or fish oil may be added to each gallon for the autumn operation, though it proves rather injurious to the tender leaves or buds if applied in the spring or summer months. At all times the mixture should be applied as warm as it can without being injurious to the leaves or young shoots, and in summer time it should be applied in the evening, when the sun is not so powerful as to injure the trees.

It may not be improper to observe, as this great pest to the apple tree has become so general all over the kingdom, that it perhaps would be of great use in making new plantations of apple trees, not to plant standards or long stemmed trees, but dwarfs, either as espaliers or not, and to keep those untrained well pruned or low in their growth, in which case they may be planted much nearer to each other, and not much less produce will be obtained.

At any rate finer fruit will be produced, and it will afford a much better opportunity for the eradication of all kinds of vermin the plant is liable to be infested with. Here I may also further add, that where trees have become much injured and retarded in their growth by those obtrusive animals, it would be adviseable to cut the whole tree down to a certain height of the trunk. The compost, as is directed for diseases and amputations, must necessarily be applied; the tree will, in the spring, push out fine healthy branches or shoots, and in three or four years become fine bearing trees, providing all is well at the roots.

As it is the opinion of many that nothing will destroy this great enemy of the apple without proving pernicious to the tree, I would respectfully entreat those who may try the effects of the above operation, for their satisfaction, to give it a patient and just examination, and the efficacy of the preparation will easily be ascertained. By it the dead insects are turned quite brown, and in the course of one day will be found shrivelled, and in two or three days more, if the weather proves dry, they will be little more than skins, while those that are living will be covered, or nearly so, with the white down as before-mentioned. If even a few escape destruction, so rapid is their increase, that it is not at all unlikely for those that are not strict in their observations, may conclude that the preparation is ineffectual, for the tree will soon again be furnished with those cotton-like locks.

VARIOUS AUTHORS' RECIPES.

SIR JOSEPH BANKS speaks of a valuable discovery having been made for their destruction, viz. the application of spirits of tar to the bark of the tree.

MR. HARRISON says, "this insect may be destroyed by attending to the following directions: When wall trees, &c. infested by it are pruned in autumn, all such parts as are cut off must be burned, and the nails and shreds be boiled. When the tree is completely loosened from the wall, it must be swept and anointed with composition. The composition must be applied by means of a soft brush. The following are the ingredients of which the composition is made: To four gallons of water add one pound of soft soap, two pounds of common sulphur, half an ounce of black-pepper, and one gill of train oil, let these be mixed together, and boiled for twenty minutes over a slow fire. It must be laid on in a tepid state, or what is called new-milk warm."

MR. PETER BARNET, of the Caledonian Horticultural Society, recommends as follows: "I collected a considerable quantity of chamber ley, and when it had been kept for several weeks, I one afternoon unnailed the affected trees, and with the garden engine washed them with the stale ley. In the following summer the trees made fine wo in every part, and the next year again they the best crops I ever saw, and they now

healthy as any trees in the garden. A few of the vermin indeed still appeared, which had been concealed about the spurs, but where the trees were clean there were none to be seen."

Train, or fresh oil, is very generally applied for their destruction.

SIR G. S. MACKENZIE, Bart., in his communications to the Caledonian Horticultural Society, respecting the utility of oil, writes thus: "The Apple Aphis *(Aphis Lanegera)* has been entirely extirpated from one garden by means of oil applied to every part were it appeared, and I doubt not of its being soon destroyed in every district of the kingdom which it has reached, if the same means be used."

MR. FORSYTH calls it a *Coccus*, and recommends for its destruction soap suds and urine, in equal quantities, rubbed on the infested parts with a painter's brush.

MR. ALEXANDER HAY, to the Caledonian Horticultural Society, recommends for the destruction of the Blue Insect, (meaning *Aphis Lanegera,)* to apply the following mixture to the stems, branches, and walls, with a brush: "Soft soap, sulphur, and tobacco juice, a pound of each, in about a Scotch quart of soft water," and recommends the summer months for the above and following operations; he removes the earth from the roots of the trees, and pours the mixture about the roots; viz. "about forty Scotch pints of soap suds, collected from the washing-house, the juice

of the 4lbs. of roll tobacco, and 4lbs. of flowers of sulphur."

Mr. ABERCROMBIE, after speaking of a species of the *Coccus* genus, which infests the branches of different kinds of fruit trees, goes on to say that " a very destructive species of the *Coccus* tribe has lately done incredible damage to the apple tree in the nurseries and gardens in the neighbourhood of London; and those insects make their nests generally where branches have been cut off," and so on; he then adds, " their first appearance is like a white down," and farther describes them, in such a manner, that I conclude that he means the *Aphis Lanegera*, and not the *Coccus*, as he calls it. " The method to destroy them is as follows: rub the places where the nests are, with an old brush, such as painters use, till they are quite clean off," afterwards apply the urine and suds in the same manner as Forsyth. I believe the whole description to be a quotation from Forsyth, without the least credit or reference to the real author.

Solutions of lime and water are recommended by various people, unfortunately without giving a proportionate quantity of each, which seems to be a great oversight in authors, not only on this subject, but of many other recipes we meet with. If the lime does destroy the insect, (which to do, it will require as much laying on as will bury them alive) it will give the trees an unsightly appearance in summer time.

The Spirits of Tar, as stated by SIR JOSEPH BANKS; train oil, as recommended by Sir G. S. MACKENZIE, and verbally by many others, and I may add spirits of turpentine, as proved by myself, and no doubt spirits of any description will completely destroy this insect, and may be applied with some degree of safety to the trunk of the tree, though they prove injurious to the bud and small branches, applied in a dormant state, and entirely fatal to the leaves and ends of the young shoots, when applied at a time when the sap is in motion. This remedy would prove too expensive to be generally resorted to.

Mr. HARRISON'S Recipe (leaving out the sulphur and black-pepper, which are of no use) might be usefully applied at the back end of the year, but would be too powerful for spring or summer application.

BARNET, FORSYTH, and ABERCROMBIE give information nearly alike. Suds by themselves are not sufficiently powerful to destroy the *Aphis*. The urine proves injurious to the leaves and shoots; and I believe both the ingredients together will not destroy this vermin.

HAY, like HARRISON, introduces sulphur into his mixture, which would be better spared: his other ingredients would be of service, providing they are not too strong for the buds, &c.; but not being acquainted with the Scots measure, I shall stop here without farther remarks.

VARIOUS CATERPILLARS.—The first of this

class, which I shall briefly describe, makes its attacks about May, or as soon as the bloom and leaf buds, break forth. When full grown, it is about an inch and a quarter long, of a light green colour, and very active. It is provided with a sort of hammock, curiously and ingeniously manufactured by itself. In forming this wonderful habitation, it first places its silken cord on one side of the leaf, and itself being placed in or about the middle, it moves its head, and fixes its cord on the other side, or sometimes to the middle of the leaf; that being done, it turns its head to the other side, and so on, backwards and forwards. The motion is like that of a weaver's hand in throwing his shuttle, and is performed so rapidly, that the spectator might suppose that hooks had been previously placed to hang the thread to. In the course of a few hours, several hundred threads will be thus placed, and exhibit a sort of fine cobweb. In this operation it contrives to draw or roll the leaf up, so that it forms a kind of irregular tube, in which it generally resides, and from which, together with young fruit, it derives its support.

When disturbed, or alarmed, it will expeditiously descend to the ground by the aid of a cord, which appears to stretch to the length required. About the latter end of May, or the beginning of June, it is transformed to a chrysalis, betwixt two or more leaves, being previously drawn together for its protection, where it remains about three

weeks, then issues forth the moth, I believe a species of the *Phalœna*. The wings are buff-coloured, shaded with a shade or two darker, across the wings, in different forms. It is rarely seen in the day-time, but, like the rest of its genus, rather chooses that its busiest moments should be in the night. About the latter end of July, or beginning of August, the parent deposits her eggs upon the underside of the leaves, and, from the aid of the sun, in a short time produces those voracious animals which immediately make their attacks upon the leaves. They there form for themselves a sort of arbour, which has the resemblance of a very small white cobweb, generally connected with the principal rib of the leaf; or sometimes two or more leaves will be drawn together, or the edge of the leaf rolled up. There they are supported and protected till about the middle or the latter end of September, when they leave. Here I cannot reflect, without astonishment, that the Divine Director has so ordered, that these little animals should seek for refuge, before the leaf, from which they derive their support, falls from the tree. It appears still more astonishing that they should exist through the winter without food. We find that they next fix their abode upon the rough part of the branches, on spurs, and in the joints between the spurs and branches. Their cell or arbour is formed of cotton-like materials, together with a coating of particles from branches, or refuse leaves, drawn to-

gether in small clusters, which only appears to common beholders like a roughness in the branches; when, however, this is examined with the aid of a microscope, or even with the naked eye, the little hermit will be found concealed in the midst of it, quite inactive. It so remains through the winter.

It evidently appears that torpidness is caused by cold, for I remember once, in severe weather, taking one of these animals into my hand, which was at first motionless, but in a few minutes, from the warmth, it became quite active. In the spring, when the sun becomes powerfully reviving, these little sluggards are moved to quit their cells of solitary confinement, and soon appear on the leaves and bloom buds. They here commence their depredations. It does not appear that much injury is done by them from the time they enter into existence to the time they become torpid, excepting that those leaves are a little ragged in the middle part, from whence they derive their support; but this cannot be so said of them on their revisiting the vernal buds at the spring, for they prove very injurious, by entering and feeding upon the interior part of the bloom and leaves, and thereby deprive the proprietor of a great portion of his approaching crop.

Another Caterpillar.—The next sort of Caterpillar appears to attack this tree much in the same manner, and at the same time as the previous ones described. It is a very dark or snuff-coloured

insect, rather less in size than the one just mentioned. It forms a chrysalis betwixt two leaves, drawn together by a thread of its own manufacturing, about the middle of June. I believe, the moth produced is of the *Tinea*, or *Phalœna* family. It is about the size of the above, but the wings not so much expanded, and are folded more round the body. The uppper part of the wings are chocolate coloured, white towards the low end, and maculated with brown. It deposits its eggs in August, upon the branches or leaves, and feeds till about the middle of September, when it conceals itself through the winter. Like the former one, it is exhilerated by the all-animating spring, commits its depredations in the flower, by gnawing through the fructuous part and leaf buds, where it conceals itself till the leaves have got pretty well out. It then forms itself a place of retirement, by drawing two leaves together with its silken cords. The injury done by this species is not quite so great as the former one, for after the fruit is well set, it ceases to prey upon it, and confines itself chiefly to the leaf till it changes to a chrysalis, which takes place before the former one mentioned.

Another Caterpillar.—A still greater enemy, we may safely say, than either of the above-mentioned, is the larvæ of the moth, I believe *Phalœna Wavarea*. It makes its attacks like the above on the leaves and blossom buds, before they expand. It is about the length of the former one

described, but much thicker, and not so active. It is of a light green, striped on each side with faint white, but the streaks are so mingled with green, that they do not appear very distinct. It lodges among leaves, but more especially amongst the clusters of bloom, and afterwards among young fruit, protected with decayed blossom, where it is most generally found curled or folded in a circular form.

About the latter end of June these animals generally let themselves down from the tree by a silken cord of their own manufacturing, and some will creep down the tree; they then enter a little depth into the earth, and form the *pupa*, and about the month of October the moth is produced, and even as late as the middle of November I have found some only arrive at the emago state, which is something larger than the two former described. The wings are chiefly of a dark or dingy drab colour. The moth deposits its eggs about the dugs, and on the branches. I am not quite certain whether the Caterpillar is brought into existence before the early part of the spring. As the perfect insect emerges late in the year, it is most probable that the embryo she produces waits the approach of the exhilerating spring, or probably some are only then deposited, as we find some considerably smaller than others; but, at all events, we find some of them attacking the buds much about the same time as the former ones described. This insect commits great depre-

dations on this tree, principally by feeding upon the bloom buds, and perforating the young apple and its stalk, which causes it to drop off, and when there is no fruit it will attack the leaves. These depredators continue their pursuit till about the latter end of June, as above, and with the aid of the two former species of Caterpillar, it is not uncommon for whole crops, or nearly so, to be destroyed. It is often erroneously supposed that the failure of the crops of Apples, Pears, Plums, and Cherries is caused by frost, when in reality these insects are the cause; although I allow that severe springs often prove fatal to fruit crops, when the cold happens to be severe at the time when the bloom is expanding, or even before or sometimes after the fruit is set or has shed its bloom.

THE DESTRUCTION of the two former kind of caterpillars will be best accomplished by applying the mixture (No. 3), twice about the latter end of August, or not later than the beginning of September, before the larvæ enter their winter residence; previous to the application, it would be more effectual to gather off all the infested leaves, (which will be readily discovered by attending to the foregoing description), and burn them. The mixture (No. 5) may be used to much advantage a little after the envelopement of the brotherhood of flowers has burst, or more properly, perhaps, when the brotherhood are dividing one from another, before the bloom begins to expand, and again after the fruit is well set, or in other words,

about when the tree has shed its bloom, or a little after this time, it will be of service to gently press with the hand all the leaves that are infested, which will be known by being drawn or rolled up, to destroy the inhabitants, which may be done so as not to injure the leaves much, if it is performed with care. The last-mentioned mixture can only be applied with any propriety for the destruction of the Caterpillars last described, just before the bloom expands, and immediately after the fruit is set. The operation in the above cases should be resorted to twice in an hour or two; the first time need not be given over strong, as it is principally intended to compel the inmate to let loose its protection, to afford a better opportunity for the second application. The operation is by hand as above, and care must be taken to gather out among the clusters all the refuse bloom which serves for a concealment to them, and the removal of which will also generally include the Caterpillar. This may be done to great benefit, to wall, espalier, or dwarf trees, and an active person or boy may go over a good many trees in one day.

SINCLAIR, to the Caledonian Horticultural Society, after detailing the various causes of blight, shows that he has, for the species of blight caused by larvæ, of what he calls *Phalœna Tortrices*, or grubs, practised the following method for five years, for the orchard trees of his Grace the Duke of Bedford, at Woburn, which has been productive of the most beneficial effects: "A

load of lime was placed in the orchard, immediately after the fall of the leaf, and was suffered to slack by the weather. Advantage was taken of the morning dews, to powder every part of the surface of the trees with the lime, while in its most caustic state. The trees then exhibit that appearance which they assume after a fall of snow, or an intense hoar frost."

LOUDON, after enumerating the Caterpillar and other insects, observes, that burning of straw and other materials, under the trees, has been long recommended, "but the principal thing to be relied upon, in our opinion, is regimen, that is judicious subsoil and surface soil, culture and pruning."

HARRISON recommends for the destruction of these insects on the cherry-tree, as follows:— "Trees infested by this insect must be forcibly washed over with lime-water, likewise be sprinkled over with powdered quick lime. This application will destroy all those it reaches to, but as some are so closely concealed that they will sometimes escape this operation, a few days afterwards the trees must be looked over, and all insects that escaped must be pinched to death. Although the directions given are effectual when pursued, yet it is a practice with me to destroy the insects in the larvæ state, by the application of the proper composition for the Cherry-trees, at the winter pruning." His composition is as follows: "To four gallons of water add one pound of soft soap,

two pounds of common sulphur, two ounces of tobacco, and one ounce of black pepper."

SANG gives a course of information of the different experiments for the destruction of the Caterpillars infesting fruit trees, and, after labouring for several years in pursuit of a proper plan for their destruction, he at length appears to have hit upon the point, and illustrates it as a most effectual one. It is as follows: "In the beginning of January last (1810), I took five pounds of flowers of sulphur, three pounds of soft soap, one pound of potash, four pints very strong tobacco liquor, the expense of all is but trifling, and made up the mixture to ten pints with fresh water. I put the mixture on the fire in a pot, and when as intimately mixed as possible, I applied it in a lukewarm state, with a painter's small brush, so as not to miss a single bud, and potful after potful was mixed up, till I had washed 34 full grown trees, Apple, Pear, and Cherry."

The most useful information that can be gathered from HARRISON's recipes is, that of the latter part of his summer operation, pinching those to death which escape the lime and lime-water, and that will include all that were living before the operation of lime, and solution of lime, as it certainly has no effect towards their destruction, and therefore the latter practice, pinching to death, had much better be adopted at the first, and prevent the tree being disfigured with the lime-dust. The utility of Mr. H.'s winter's operation for their

destruction needs no further comment than what is advanced upon Sang's recipes.

The ingredients which SANG's mixture is composed of, are all invested with properties productive of pernicious effects upon Caterpillars in general, except the sulphur, which is of no more service than the black pepper, as recommended by Harrison. But although the mixture is composed of ingredients sufficiently efficacious for their destruction when unprotected, so well secured are the Caterpillars at the above period, by a well manufactured filmn, that I doubt whether it will prove at all useful for their destruction. It would but require little trouble to prove it, by applying it on one side of the tree, and leaving the other undone. I have been anxious to find means for their destruction in winter months, and have tried boiling water, oil, different kinds of spirits, soap, potash, and many other things, but never found them productive of any good at this period.

The Caterpillars, at the above period, when SINCLAIR performs the operation, are too well protected for it to have any effect upon them; and even if they were unconcealed none would be destroyed. To prove this, a few may be dusted thick over with lime, any time when feeding in the spring months, and it will be found they will even then escape destruction.

It is doubtful whether the burning of straw, &c. is of any use towards their eradication. Regimen, as held forth by LOUDON, certainly produces

luxuriance and health far exceeding those neglected, but the above insect enjoys the healthy plant as much as those of a more delicate nature, and therefore the number of insects is still the same; and the only advantage derived by regimen is, that it affords a greater share of vegetation for consumption, and must require a greater number of consumers.

Another very remarkable sort of Caterpillar which frequently and numerously attacks the leaves of the Apple, as soon as they are pretty well expanded, is furnished with a kind of tent, manufactured of materials produced by itself; and apparently it is a very good house or tent keeper, for I never found it at any time absent; indeed I believe it never ventures out of doors farther than about half the length of its body, when moving its tent, till it arrives at a winged or perfect state; but at all times when it has occasion to move for a fresh supply of food, it artfully moves its tent, which, at this period, is but small, but proportionable to its size. It is increased in extent accordant with its inmate, to the dimensions of about three parts of an inch long. It has a brownish appearance or colour, and is of a cylindrical form, and is placed nearly perpendicular, in which manner it is supported by silken cables, which the little engineer manufactures as well as fixes in such a manner as to support it in the above upright manner, and which it lets loose

when it wishes to station itself in another part of its possessions.

What adds still more to its singularities is, that the little inhabitant never appears to prostrate itself, like the generality of Caterpillars, but is always placed with the head downwards; and were it inclined to alter its position, the habitation is so contracted in its width that there does not appear to be any possibility of its doing so in the inside. The only relief it appears to have from the above perpendicular position is when it lets loose its cables, to move for a fresh supply of food, which, when obtained, it soon raises its tent to its former position. With the aid of a microscope, we find the outside of this case appears of a roughish texture, and the inside is very fine and silky, and the whole so well woven together, that it is difficult to tear it in pieces with the hand alone. It appears to be calculated to resist all kinds of weather.

About June the Caterpillar forms a chrysalis, and, in a few weeks, issues forth a small brown moth, I believe a species of the *Phaloena serratella*, which in August deposits its eggs upon the top side of the leaves, and in a short time, from the aid of the sun, brings forth the Caterpillar. It obtains support on the leaves till about the middle or latter end of September, when it is warned of its danger, and sets out with its tent on its back, to encamp for the winter months

in a more secure part of its dominions, viz. that of the branches, among the joints and spurs, and there it remains torpid throughout the winter. At this time it is of a very small size. The cover or tent resembles the seed of hay in size and colour, but crooked, similar to a horn in miniature. This little hermit, as well as those described in the preceding pages, has to await the animating sunbeams to empower it to quit its winter abode, to possess the plains more eligible for a summer encampment, and generally commences its campaign about the beginning of May, when it will be seen in all directions, carrying along with it its tent, apparently using every precaution to procure a proper and fruitful plain for its station, which they never fail to obtain; and thus the leaves become furnished with those little tents, which have a very remarkable appearance when fixed in a perpendicular position on their surface.

The injury committed by these Caterpillars is not so serious as that done by the three former ones, as they derive their support from the foliage, and not from the bloom or fruit. When the trees are numerously visited, which sometimes is the case, they render them unsightly, from the spotted appearance produced in deriving their support. The top rind and the pulp of the leaf are generally consumed, leaving the bottom cuticle, or rind.

FOR THEIR DESTRUCTION the Mixture (No. 3) should be adopted. It is to be applied with the engine in the fore end of October, but as the cases

or covers are impenetrable, it will be most judiciously applied early in the morning, or late in the evening, when the cables of the tent are let loose purposely, for the little hermit to procure subsistence; or in winter time, a moderate quantity of boiling water, might be applied with a watering can all over the tree, to those that can be readily got to. But this must only be done when the tree is lying dormant.

Another Sort of Caterpillar, which sometimes proves very destructive to the foliage of this tree, will be found in societies about the beginning of May, which at their first appearance form to themselves a kind of hammock or covering, by fixing their thread from one side of the leaf to the other, and as they advance in strength form a new habitation on a more extensive scale. Indeed their design is unbounded, for it appears from the first commencement of their latter residence that they are continually extending it, till nature directs that they shall retire from their labour, and form individually for themselves a more humble one. The union retreat will frequently be found to include several small branches or twig ends with their leaves. This residence is not contrived in so orderly a manner as some are by the insect race,—there appears to be a kind of confusion. Still it is so judiciously managed, to connect it with their food, that at the time of danger or alarm, they never appear to be at a loss in making their retreat to the more secure

part of it. The materials of which it is composed are rather coarse in comparison to the workmanship of the generality of insects. Some parts of the hammock is woven very thick and strong, apparently so as to resist a good deal of wet. This Caterpillar is inclined to a black, spotted with ten round deep black spots on each side, and in size I may say not more than half the bulk of the well-known Caterpillar so injurious to the foliage of the berry bush; it is very active, and very soon alarmed at the approach of any thing. About the beginning of July, each individual incloses itself in a cone or covering of white silky materials, very close and strongly worked, of an oval, or rather approaching to a cylindrical form, and the whole are enveloped in one mass by their webs, similar to those of spiders, as before described. It remains in this, or chrysalis state, about three weeks, when a beautiful little moth is produced, I believe small ermine moth *(Phalæna padella)*. All the four wings are of a blue white; the top ones are spotted over indiscriminately with several very small round black dots; the lower ends of the four wings are bordered with a fine fringy border. I have been long undecided as to when the parent deposits her eggs, and when the larvæ are brought into existence; but have at last been satisfied from the following observations: In the year 1827, 29th July, I found the parent coating her eggs over, which she appeared just to have been

depositing with gummy matter, employing her tail in the operation, which when dry forms a thin shell or scale, about the eighth of an inch in width. On the 19th October, on examining the scale, I found twenty-six Caterpillars existing, which I am persuaded had never left their abode, as at that time all the parts were completely shut up, and indeed the edges of the scale were fast cemented to the branch. I think it probable they may derive some little support from the sap of the branch under the shell or covering where they reside, but it is quite clear they never emerge from their birth-place, to obtain food or form any additional residence, till they are influenced by warmth in May, when they begin laboriously to extend their boarders, as before described. These little animals sometimes prevail very extensively, even so as to strip whole orchards of their foliage, which I need not remark must have a tendency to injure the trees very materially, as well as to give our orchards their winter appearance at a period when they ought to assume their richest verdure.

FOR THEIR DESTRUCTION nothing more is required than the application of strong soap suds, forcibly applied with the engine, so as to break the web, that the suds may reach the insects; or in place of the suds, Mixture (No. 8) applied in the same way, will answer the same end. When the trees are not much infested, gather the webs, including the Caterpillars, by hand, and destroy them in any way most convenient.

ACARUS, OR RED SPIDER.—The Spider infesting the Apple tree is similar to those which attack the Gooseberry bush, but rather less in size, and its process differs materially. The first appearance of these animals on the tree, in the spring, is about the beginning of May, and, like several of their genus, they are so diminutive as to require the aid of a microscope to see them distinctly. They chiefly feed on the underside of the leaf, and sometimes in hot dry weather on the upper surface. They appear not to be furnished with webs like those on peach and nectarines. About the latter end of June, and beginning of July, the first brood leave the tree, to return no more, after depositing their eggs on the underside of the leaf. I have seen upon an average about twenty-five eggs upon one leaf. In the course of a week a second cletch is produced, which, if the weather proves hot or dry, deposit their eggs at the latter end of July, and leave the tree. The eggs, about the middle of August, issue forth a third cletch, which remains till about the middle or latter end of September, when, after depositing their eggs, they leave the tree, as all the former broods, and die. But how remarkable it is that the last brood, like one species of the *Aphides* already described, quit the leaf contrary to the practice of the former brood, and place their eggs on the branches, spurs, &c., as though it were prognosticated that the period was near when their former residence

would not afford protection to their progeny, and that a more secure abode must be resorted to. In this state and situation the eggs, which are quite round, of a faint red, remain during the winter months, and survive the most inclement weather. They become animated about the fore end of May, and produce the Spider as above. The effect of their depredations will evidently appear by the leaves which they annoy turning brown, as though they had been scorched by the sun's rays. Dry warm weather is most congenial to their progress, as the reverse renders them torpid, which naturally causes them to abstain from feeding. Trees numerously infested by them present a very unsightly and sickly appearance, more like the fall of the leaf at the back end than the summer season.

FOR THEIR DESTRUCTION, the Mixture (No. 3) should be applied all over the tree, with the engine, about the middle of June, the middle of September, or any other period, when they are not in the egg state, but the former period, and sometimes the September months will be the best, when the fruit will not be injured with the mixture.

THE THRIP sometimes prevails to the injury of the fruit and foliage of this tree, especially on those that are trained against walls. The effect produced on the leaves is similar to that produced by the Red Spider, except that they appear a little more spotted, as the bite of this insect is something

deeper in the pulp of the leaf. For a further description of its process, see on Peaches and Nectarines ; make use of the Mixture (No. 3) in the some manner as directed.

SCALES AND COCCI.—This tree is liable to be attacked in all parts by a species of the Scales, or *Cocci.* It is of a very small size, so that if the bark of the tree is not smooth and fine, and the insects numerous, they will easily be overlooked by those who are not acquainted with them. They tend greatly to injure the health of the tree and flavour of the fruit. I have seen, where trees have been neglected, especially against walls, those little insects prevail to such a degree, that the tree has not had sufficient sap to produce young wood, or to bring forth the fruit to half its proper size, and in flavour worth nothing. For a farther description and their destruction, see on Pears.

LARGE SCALE.—If trees should be attacked by the large Scale, described on Grape Vines, and the one on Apricots, let the same means be applied as directed respectively on the Vine and Apricots.

As various kinds of insects are often introduced from the nurseries with young trees, it would be advisable to immerse or brush all young trees, which are received from nurseries, before they are planted, all over the roots, as well as the stems, with the Mixture for the American Blight, (No. 3.)

When the Apple is trained against the wall, all shreds, which are intended to be used again, will require to be immersed in boiling water, to destroy the egg, larvæ, or chrysalis, of various kinds of insects, which are often secreted amongst them; also the branches which are cut from the trees, at the time of pruning, should be burned. By those, and the foregoing steps being closely attended to, I have no doubt that the Apple, one of our favourite and most useful fruits, will be made productive, and attain to the greatest perfection, providing all other proper culture be followed up.

THE PEAR TREE.

SLIMY LARVÆ, OR SLUG WORM—This tree has a variety of enemies to contend with. The first, which I shall endeavour to describe, is one which I believe is not very general or common in this country. It first came under my notice in 1821, and is most probably the kind which KIRBY calls Slimy Larvæ, or at least a very near relation. He asserts that it is prevalent in North America, and is there called Slug Worm. He says, "in 1797, it became prevalent to such a degree that the trees were covered by it, and a breeze of wind passing through those on which it abounded, became charged with a very disagreeable and sickening

odour ;" the one in question is covered all over with a slimy matter, and produces an odour which I should suppose similar to that mentioned by KIRBY. Even the few which have infested trees coming under my notice have, when passing the trees, produced this odour, and on approaching more closely to the leaves which were infested, the effluvia or smell produced was nauseous and sickly. The head of the larvæ is quite obtuse, tapering to a smallish point at the reverse end. It is very sluggish and inactive. While in the act of feeding, it retains this glutinous appearance, and is nearly black, but when this is cleared off, or when it is about leaving the tree, to undergo its first change, it assumes a yellowish appearance, except the head, which is black. The first cletch of young makes its appearance about the beginning of July, and feeds about four or five weeks upon the leaves of the tree, then it descends into the earth, and forms to itself a case or covering, the inner part of which is composed of silken materials, produced from itself, which is ingeniously coated over with a little earth. It is of a longish round shape, and so much resembles small lumps of earth, about the size of a moderate pea, that it would easily escape the notice of a careless observer. I am led to believe that it must only remain in its cell a few weeks, when the Sawfly *(Tenthrido Cerase)* is produced, which is the progenitor of another generation in the same year, as I have found young ones

upon the leaves very late in the season; but as I cannot be quite clear whether or no a second generation is produced, I must leave it as a supposition. Those which appear late on in the season remain in their cell through the winter and a portion of the spring months. The fly produced is about the size of a common Red Ant. The abdomen and thorax, or the lower and the upper part of the body, are slightly united together like the Ant, the head obtuse; thorax and the abdomen black at the top side, and underneath flesh-colour; wings clear or transparent, with distinct ribs or membranes, the underneath wings not quite so large as the top ones. To give some idea of its size and shape, it might be compared to the Red Ant in its winged state. It deposits its eggs the latter end of June, upon the top side of the leaf, and in a few days, from the influence of the sun, the young are brought into animation. I have never yet met with any trees which have apparently suffered materially by them. The greatest evil arising from their attack, except the tree should be numerously visited by them, is the spotted or unsightly effect which is caused from their feeding upon the upper rind and pulp of the leaf, leaving the bottom entire, which soon becomes brown or dead to the extent of those parts on which the insect has prevailed.

FOR THEIR DESTRUCTION.—Dust the tree over with quick lime, at any time of the day, except the tree should be wet, which would cause the

lime to adhere to the leaves, and give them an unsightly appearance, whereas, if they are not wet, most of the lime will fall; but the exuded matter that the insect produces, will retain a sufficiency for its destruction. A good washing with clear water from the engine in a day or two after will be of service to cleanse the remaining lime off the tree.

CATERPILLARS.—This tree is liable to the attacks of the various Caterpillars which infest the Apple Tree. The same steps may be taken for their destruction.

SMALL FLY.—A remarkable insect, the larvæ of a very small fly, makes its attacks generally in some situations, upon the foliage of the tree, about the beginning of July. Its head is black, and body the colour of a common maggot; it has ten joints or annular rings round its body, feeds till the beginning or middle of August, when it retires into crevices of walls or trees and shreds, where it is transformed into the chrysalis state, which is protected or coated over with a silken membrane, closely and firmly manufactured, which forms a strong representation of white lettuce seed, both in size, shape, and colour. In this state it remains through the winter. About the middle of June the Fly is produced, which is black, and so diminutive as to require the microscope to distinguish its form. The whole insect, wings and body, is not thicker than a very small pin. In miniature similar to a winged ant.

The top pair of wings are a little longer than its body, its head similar to that of the house fly. About the latter end of June it deposits its eggs upon the top side of the leaf, and in a few days after the young are brought into existence. The little miner does not survey and bore in various directions in search of the most valuable productions, but contents itself with these possessions allotted to it by its parent, where it immediately commences perforating its way into the body of the leaf, and there it labours in its mine, which is chiefly confined to a circular spot round about its first possessions; but it completes its work in such a manner, that only the upper and bottom cuticle of the leaf is left, no doubt for self-protection. In this apparently solitary cell it remains without quitting it for about six weeks, when it leaves it to undergo its transformation, as already mentioned. The portion of the leaves thus infested assumes a brown inflated appearance, and has no doubt been productive of much surprise, and is by some misrepresented as being produced by the scorching rays of the sun at a time when limpids of water have been lodging on the leaves. These spots are most generally in a circular form, at least for a considerable time after the commencement of the animal's feeding, which is caused by its pursuing and consuming a circular course round the place it first entered. It repeats and extends its circuitous route as food is required, sometimes to the extent of the greatest portion of the leaves.

Trees in this way are often, especially when against walls, rendered very rugged and unsightly.

FOR THEIR DESTRUCTION.—A short time before the insect leaves for transformation, place close to the walls short pieces of bean straw, or woollen cloth, in a manner that will be most alluring to them, to retire into. Any time in winter remove and burn them. Unloose all the shreds, and those intended for use put them a few minutes into boiling water; but previous to the trees being unloosed a sheet or mat should be spread to catch all the insects which may fall in the operation; and while the branches are loose, the parts next the wall should be brushed over with a painter's brush. At the same time pour boiling water all over the wall, in a sufficient body, with a watering pan without a rose, so as to scald the insects lodging in the crevices of the wall; or at the first appearance of the spots on the leaf, they may be crushed with the thumb and finger, without injuring the leaf, by a boy or any one else.

SMALL SCALE, *(Coccus.)*—This little depredator makes it appearance upon the tree about the middle of May. At this period it is nearly of an oval shape, furnished with six legs and two horns. The whole body is a cream colour, or yellow white, and in size so diminutive, that it can only just be discerned with the naked eye, and requires the microscope to distinguish it properly. It wanders pretty actively over the tree for a short time, most

probably in search of a suitable situation for a permanent abode. When obtained, or perhaps when nature calls for sustenance, it makes its attacks upon any part of the tree, either trunk or branches, leaves or fruit; all appears to be alike that happens to fall in the way, and soon after being permanently fixed, it commences manufacturing itself a film, which at an early state of its process is nearly round, white, and downy, which gradually becomes testacious, increased in size, and altered in form, and when attained to its completion the shell is brown, about an eighth part of an inch long, obtuse at one end, and gradually tapers to the other end: it is rather arcuated or bended. The whole is emblematical of a Cow's horn, except that side which adheres to the tree, which is flat. This side of the shell is always closely and firmly cemented to the tree, I believe without being moved, after the commencement of its formation. They will frequently be found so numerously and closely assembled as to render it impossible for them to form fresh habitations. About the latter end of August the parent quits her eggs, which are quite white, rather of an irregular long round form, and of the amount of twenty to thirty, and shortly after dies in the shell. The scale or shell still assumes the same appearance, and if not dislodged, would probably remain on the tree for several years. About the middle of May many of the young are moved to quit the ova, and from this period till about the

middle of June, some continue to issue forth from the egg. Each family, as they are brought into existence, set off from the door of their family abode, in various directions, in pursuit of establishments of their own choice.

These insects, when numerous, give the tree a rusty dead-like appearance. The tree is not only retarded in its growth, by the insect absorbing the sap, but materially injured for want of a free circulation of it, which is prevented from their vast numbers firmly cemented to the tree. In this way I have seen trees, not only of Pears, but of Apples, Plums, and others, so completely stagnated as to scarcely make any growth, and the fruit produced not half its proper size, much crippled, and in flavour worth nothing.

FOR THEIR DESTRUCTION.—The Mixture (No. 3,) must be applied well with a painter's brush all over the tree, at least twice, the first time not later than the beginning of June, and the second time in the middle or not later than the latter end of June. There should not be much variation in the time here specified, as there is at least a month difference in the time of the first and the last issuing forth, and therefore there is a danger of the shell of the first becoming too hard for the Mixture to penetrate sufficiently by the time the latter ones have quitted the ova.

At the winter pruning, all the refuse branches should be gathered and burned, and to do it more effectually, a cloth or mat should be spread to

catch the smaller pieces, for were they to be left without means being used for their destruction, they would issue forth at the spring, and ascend the tree.

FORSYTH, HARRISON, and ABERCROMBIE exemplifies it as being like a boat or keel turned wrong side up, meaning, no doubt, the shell, as the insect has no such appearaance.

FORSYTH and ABERCROMBIE recommend as follows :—"When these insects first appear on the bark they should be scraped off with a wooden knife, and the stem and branches of the tree well washed with soap suds and urine, applied with a stiff painter's brush, and should be done in February, before the buds begin to come out."

HARRISON recommends the tree being scraped with a blunt knife, similar to what is communicated by FORSYTH, and then to be anointed with the following Mixture :—"To four gallons of water add half a pound of common sulphur, half a pound of soft soap, one ounce of nux vomica, two ounce of black pepper. The nux vomica must be grated small previous to the boiling of the whole. After being mixed together, they must be boiled for half an hour, this will completely destroy any insect of this kind which may be left upon the tree."

The practice of scraping the trees by the above authors certainly will be productive of some good, providing a cloth be spread, as HARRISON directs us, to catch the eggs; but as for the Mixture they recommend to be applied after the scraping,

it will be quite useless, as there is no insect in the winter months, and as for the Shell or Scale (the supposed insect), it never required any thing to take away its existence, for it never was possessed of life. I am persuaded the vitals of the ova cannot be destroyed, a topic which I have before adverted to, at least with chemical preparation that would not injure the tree; and I cannot pass on without just observing how strange it appears, that if the Mixture is applied to destroy those remaining after the first operation, and has the effect described, why it could not be applied in the first instance to destroy the whole, for it evidently would prevent much trouble in the tedious performance of scraping.

COCCUS VITIS, AND THE ONE DESCRIBED ON APRICOTS.—Should the Pear tree be infested with these two large Cocci, for their destruction see on Apricots and Vines.

WASP, *(Vespa Vulgaris)*, AND FLESH FLY, *(Musca Vomitoria.)*—The fruit is liable to be much annoyed with those insects; they may be decoyed into bottles by the liquor, as directed for Peaches and Nectarines, and it would be well to bag the finest fruit, as there described, which will also be a protection against birds billing them.

THE PLUM TREE.

APHIS.—This tree is attacked sometimes by a similar kind of Aphis to the green one described on the Apple tree, but not the same, as it appears they are not oviparous: the effects produced while feeding cause the leaves to curl or fold up.

FOR THEIR DESTRUCTION.—Apply the Mixture (No. 1) at the end of April or beginning of May, when the insects first make their appearance, providing the trees are not in full bloom. If the operation is neglected till the leaves become curled it will be necessary to pick them off previous to the application.

THE APHIS, OR MEALY LEAF LOUSE.—This species is rather larger than those already described upon Apples; they have the appearance of being dusted over with flour or meal, which transpires from the body of the insect when in the act of feeding. I am not quite certain whether at any time this species, like the former one described on the Apple tree, is oviparous. If so, the egg must be deposited in the earth, as I never discovered them at any time upon the trees, shreds, or walls; but it is certain some of the latter cletch produced in October, like the Aphis Lanegera, survive the winter, protected in crevices of the tree, walls, or other concealments, and others descend into the earth, and in the spring ascend the tree, and station themselves on the underside of the leaves, and although those surviving at first be ever so few, they are so mul-

tifarious, that in two or three weeks the whole tree is liable to be very numerously infested by their offspring.

This species, like the rest of its genus, is the progenitor of several generations in one year. At different periods, they become furnished with wings, and emigrate to different parts of the garden, and sometimes to a much greater distance. They appear seldom to attack any other tree but the Plum or Plum stocks. Their favourite prey is the leaves and twig ends of the most luxuriant young branches, and not always the weakest branches, as we find commonly asserted, a natural mistake made by indolent observers, for these animals immediately not only check the progress of the branches, but produce inability or weakness, but even completely destroy the latter growth of the branches, dirty and destroy the beauty of the whole tree, cripple and besmear the fruit, so that, for want of beauty and flavour, it is rendered nearly useless. Even whole crops have, in some gardens, not been worth gathering.

FOR THEIR DESTRUCTION.—Should the summer pruning and nailing not be done, it would be of greater advantage in saving the mixture, and rendering a better opportunity for the performance, to have them done before the application of the Mixture. At the summer season the Mixture (No. 1) may be applied; but as the fruit of some kind, such as the Orlean, Precocede de Tours, and many others, is liable to crack in

wet weather, care should be taken not to apply the Mixture too often when the fruit is advancing to its full size, as it will be productive of a similar effect. Care must also be taken to look over the trees frequently, for should a few escape, they would, in a short time, be numerously inhabited. It will also be proper to apply the Mixture (No. 7) twice at the fore end of October, when the latter family are feeding, before they retire.

It will be of great service in applying either of the above Mixtures, frequently to stop the engine, and the assistant immediately, with a wisp of hay, or something similar, brush the leaves upwards, to spread the wet that is upon them to such parts as may have escaped; at the same time care should be taken not to bruise the leaves. Summer applications should be performed early in a morning, or about five o'clock in the evening, and the back end at any time of the day, as no material injury will be done to the foliage at that period by the sun's rays.

FORSYTH recommends to "take some fine wood ashes, mixed with one-third part of fine unslacked lime, and throw it on with a common dridging-box, till you have covered the underside of the leaves. Where you find the insect, this should be done in the morning early, while the dew is on the leaves, which will cause the powder to adhere to them, letting them remain so covered with the powder for three or four days, then mix unslacked lime and soft water, at the rate of half

a peck to 32 gallon, and stir it well two or three times a day for three or four days. With this liquid. after the lime is subsided, give the trees a good watering, observing to throw a considerable part of it under the leaves by an engine. This should be repeated once a day for six days, which will destroy all the Aphis."

WEIGHTON, in his communications to the Caledonian Horticultural Society, after stating his opinion of the Honey Dew, and making some effort to prove that it is the first inducement for the Aphis to resort to the tree, says, "a few days after the Honey Dew comes on, the Green and Blue Fly appears, especially upon Plum trees;" and a little lower down, in the same page, he says, "It is imagined by some that this glutinous matter is perspired by the tree, and that the insects come to feed upon it; and this, he says, is my opinion. To get rid of them, I water the trees two or three times a week, in a plentiful manner, if the weather is dry; and while the Honey Dews continue upon the trees, I add a little salt and a quantity of broom boiled to the water. This mixture effectually kills the Fly, and does not injure the trees, if too great a quantity of salt is not added."

If the powder by Forsyth is applied for the purpose of destroying the insect, which I suppose it is, where is the use of the lime-water? Should it be for the purpose of cleaning the trees of the dust previously applied, I should certainly give

preference to clean water in its stead; if applied for the destruction of the remaining insects, why not save the labour and nuisance of applying the powder? or if either or both of these are efficacious for their destruction, I should say, only apply one of the remedies, which would save a deal of trouble; but I must further say, that both trouble and expense would be justly prevented by excluding both practices, as they are both useless.

As I have already alluded to the cause of the Honey Fall in the chapter on Apples, I would only just observe, I must differ in opinion with Weighton and in place of supposing the insect to be allured by the Honey Dew, I would reverse the matter, and assert that, in a few days after the Green Fly appears, the Honey Dew, as it is commonly called, also appears; and I would once more entreat Mr. W. and those of my readers who are of his opinion, to give it a due investigation, and they will no doubt be convinced that the glutinous matter is nothing more than what I have before, I trust satisfactorily, proved to be the excrement ejected by the species of Aphis infesting the tree on which the fluid is found.

THE COCCI, or different species of SCALE.—See respectively on Pears, Apricots, and Vines, and use the same method for their destruction.

CATERPILLARS.—The various Caterpillars, I believe the same genus as those described on Apples, are very destructive to the bloom, fruit, and foliage of this tree. They very often prevail,

even to the destruction of nearly whole and very promising crops, and so lacerate the foliage, that the whole tree assumes a dilapidated state.

FOR THEIR DESTRUCTION.—After the fruit is gathered or not later than the first few days in September, (for, from the middle to the latter end, they retire, and are more securely protected,) pick all the spotted leaves off produced from the larvæ, scolloping or consuming the bottom cuticle and pulp of the leaf, as described on Apples, and those with the edges rolled up, or leaves drawn together on the spurs, and those stuck to the walls, before the following application of the Mixture (No. 3.) It must then be immediately applied that it may fall on those which might be thrown down or left unclothed by the former operation, before they make their escape.

The Mixture (No. 5) might also be applied to some advantage at the spring, just before the bloom is about to expand, at which time many will have left their cells in search of food; and at this time the buds will afford but little protection to them. The Mixture should be quite warm, and applied early in the morning, which will destroy all on which it falls. Care should be taken to let the last watering be done before the bloom is quite expanded, for were it to fall on the interior of the blossom, it would injure it very materially; and yet it should be as near the time of opening as possible. All wall trees that are liable to these depredations should be unnailed

at the winter or spring training, and such shreds as are to be used again should, for a few minutes, be put into boiling water, as several of the Caterpillars are concealed in them through the dreary months of winter.

Another kind of Caterpillar commences its ravages about the latter end of July or beginning of August, upon the foliage of the tree. It is quite small and long, and in colour rather green, spotted with brown down each side. It is very active, and forms an hammock, or place of retirement, similar to those already described on Apples, which produces the Moth, *(Phalæna Padella)* Small societies are formed, which feed a few weeks, till nature calls them to retire from labour into their hammocks, where they are transported into the chrysalis state, and produce a very small grey Moth (a species of the *Phalæna*), in the month of May, not more than a fourth the size of the *Phalœna Padella.*

I have not yet been able to ascertain the period when the egg is deposited, but the first appearance of the Caterpillar, which I have noticed for several years, has always been about the latter end of July and August, but it is probable that these may be a second cletch. These depredators prevailed, in 1823, to such a degree upon some trees nailed on a north aspect, that each tree was nearly stripped of all its leaves, and spread over with a tenacious web, and presented a miserable spectacle.

For their Destruction.—The Mixture

(No. 8), leaving out the tobacco; or strong soap suds may be applied with effect. The application should be done by the engine, with force to break the web or filmn, when the sun is not powerful, lest it should injure the leaves.

CHERRY TREE.

Black Leaf Louse, (*Aphis.*)—This species of the Aphides generally commences its ravages about the latter end of April or beginning of May. It is of a middle size in comparison to the rest of its genus, plump bodied, and completely black. In its perfect state it is supplied with wings, which aid it to emigrate into different parts. It establishes its progeny at all times viviparously, and, if possible, breeds more numerously than any of the species already described. A general emigration takes place about the middle of June, when the trees become released from these ravenous and unparalleled pests. Those trees, which are first infested at the spring, are possessed by emigrants that arrive in the month of September, from where I cannot tell. probably from field or garden productions, for it is remarkable that the Cherry tree is not possessed by them from the middle of June to the fore end or middle of September. At the latter period it again becomes the choice of this insect, in its perfect or winged state, to establish her progeny,

after the accomplishment of which she dies. The offspring, after feeding till necessary to repair to its winter quarters, quits the leaves, and conceals itself in the earth, or other places of protection, through the winter, and ascends the tree at the spring, and resumes its attack on the underside of the leaves. In process of time, leaves, shoots, fruit, and fruit stalks, become in possession of her progeny, and I need not add, before they spontaneously give up their possessions, the whole are materially injured.

FOR THEIR DESTRUCTION the trees may have a good washing at the latter end of September, before the insects make their exit, with the Mixture (No. 7); or at the spring, any time betwixt the setting of the fruit, and the commencement of its ripening, the trees may be washed with the Mixture (No. 1); but immediately after the fruit is well set would be the most proper time for the spring performance. The whisk must be used at each operation.

THE CATERPILLARS.—This tree is also attacked, I believe principally by the various species of *Phalæna*, those described on the Apple tree. The massive groups of bloom buds which this tree naturally produces on each spur, afford better protection to them than the Apple tree, and, when in a dormant state, many will be found upon the branches, protected, as well as those among the buds, with a coating or vesture of their own manufacture, which is roughly cased over with particles of leaves and other materials. It is

not at all uncommon, in most parts of the kingdom, for these secreted enemies to consume whole, or nearly whole, crops of cherries. This tree appears, if any thing, more resorted to than the trees already mentioned, especially by the two first species described on the Apple. About the time that the flowers are bursting the envelopment which incloses each group, and when separating from each other, they leave their cells, and often enter the flower while it is yet green, several days before it expands, and feed at first upon the fructification part only, while the flower petals are suffered to expand. This is often sufficient to deceive the proprietor or gardener, who are not minute observers, and leave them to conclude, when fruit should appear, that either white frost, cold winds, blasts, or heavy rains, have destroyed it.

FOR THEIR DESTRUCTION.—On a fine warm day, when the buds are dividing, about ten days or a fortnight before the blossom expands, the Mixture (No. 5) may be applied freely with the engine. Many will be destroyed at this period, as they are leaving their winter abode, and are unconcealed, yet the best time and plan will be to pick off the infested leaves (symptoms of depredations as described on Apples), about the latter end of August or fore end of September; then, to destroy those that are not dislodged with the leaves, apply the Mixture (No. 3) with the engine; or, if their destruc- be delayed till they are folded up in the leaf,

at the spring, gently press all such infested leaves with the hand, so as not to injure them but sufficiently to crush the Caterpillar. The Mixture (No. 5) will destroy many, if applied twice in one day, at the time when they are folded up in the leaves, the first time over. The former washing causes them to let loose their cables, and therefore the latter watering has a better opportunity to fall upon the unclothed animal. I need not say it must be minded not to apply it when fruit is ripening, as a matter of course it would be rendered unpleasant when wanted for the table. In a day or two after the performance, let the tree be well cleansed with clear water.

FORSYTH on Orchards, recommends, as a good preservative from blight, Caterpillars, &c. the burning of rotten wood, weeds, potato haulms, wet straw, &c. on the windward side of the trees, when they are in bloom.

I cannot say any thing experimentally respecting Forsyth's practice of smoking orchards, and therefore I shall content myself with only observing, that the operation should be cautiously resorted to, as undoubtedly there is a danger of the bloom being destroyed by it when it is expanded.

Sparrows, Black Birds, Thrushes, Jays, and other small and large Birds, are very destructive to the fruit when it is quite ripe. The wall or espalier trees may be completely protected by hanging netting over them. Fishing nets, that

are no longer useful for fishing, would answer the purpose very well, and I have no doubt may be procured at a moderate expense from any of the ports where fishing is carried on.

The best methods I know of for protecting the fruit on standard trees is to stuff a sparrow or moor hawk. Place it as prominent as possible, and in a manner as though it were living in the midst of the tree. The figure of a man, or a large dead bird, and cats, are generally supposed to be of service, fixed in the tree. A sort of rattle which produces a noise similar to that which watchmen use, is used in some places. The sound is produced by the wind turning round sails in miniature, like those employed to work the machinery for grinding corn, commonly called wind-mills. This, I have no doubt, proves alarming to the birds.

PEACH AND NECTARINE.

Red Spider.—A species of Red Spider, *(Acarus Holosoriccus)* visits these trees before the least vestige of the foliage appears. At this time it is of a very small size, quite red. When it becomes full grown it is changed to a red brown colour, much of an oval shape, except the head part, which is a little more obtuse than the reverse end, and the whole body is flat, furnished with six

legs, and two antennæ or horns. It may just be distinguished with the naked eye. It feeds till the latter end of May or the beginning of June, when the female deposits her eggs, and afterwards dies. I am not positive whether there is more than one generation produced in one year; but I believe the egg remains inanimate till the back end of the year, when the young are brought forth, feed a little, and afterwards retires into the earth, or deep crevices at the bottom of the wall, and early in the spring are exhilerated to resume their attacks. Even so early as the middle of February, when the weather proves favourable, these little animals, which for several months have been motionless, wander with great activity over the trees, hunting for food, but are frequently under the necessity of retiring without obtaining it. They principally derive their support from the leaves, and partly from the bloom. The trees being thus attacked, at so early a period of their growth, the mischief they commit is very great. They bite the edge of the leaves as they burst through their corticated covering, which for several weeks prevent the shoots making any progress, weakens the bloom, so that it drops off, and deprives the leaves of their juices, so that the sun and wind shrivels up their edges, and produce the appearance as though they had been scorched with fire.

These, together with the *Acarus Telarious*, attacking the tree at so early a period, no doubt are the cause of what is commonly misconceived, and

very improperly termed, a blast, caused by cold east winds, or something in the air which cannot be accounted for. After the leaves are pretty well expanded, this species feeds on the top side of them, which gives them a light freckled appearance.

RED SPIDER.—*(Acarus Telarius.)*—This species of the Red Spider is well known as a formidable enemy to the horticulturalists. Among the numerous productions of its choice, those trees may be justly said to form a portion of them. These little animals are often influenced by fine warm weather, about the middle of February, or indeed sometimes sooner, if the weather is generally warm and serene, to awake from their torpor, and may be seen wandering over the branches of these trees with alacrity, and at the approach of the evening, or cold and rain, they retreat into their former abode, or some similar retirement.

Thus they are allured by warmth to parade the trees for several weeks before the trees can afford them the least support, except they derive any from the scale of the bud, or cuticle of the branches. At this period they are not half their full size, and of a clear scarlet colour. When full grown they are of a straw colour, with a brown spot on each side. The body is of a long oval shape, the head and hind parts more acute than the former one described, the body not flat, like the other species, but rotunded, legs and horns similar to the rest of its genus.

This brood assembles in groups, on the under side of the larger leaves, about the latter end of April, when they form fine delicate webs, no doubt designed for a protection to their progeny. They deposit their eggs, and shortly after die. At first the eggs are quite round, and of a clear light colour, and afterwards change to a reddish brown. They will, if the weather proves favourable, be hatched in about ten days after they are quitted by the parent. From this period, through the summer months, there will be several generations, and always a mixture of eggs and living animals, till the latter brood emerge from the ova, about the fore end or middle of September, and remain on the tree a few weeks after, providing the weather proves fine. About the middle of October they will principally have left the tree, or sometimes before, should the weather become cold and wet, at which period there appear to be no eggs left unhatched.

The Spider's retirement through the inclement months is principally in nail-holes, crevices of the wall, and shreds which are used in training the tree, and in the earth, close to the walls, &c., where they remain torpid till they are animated by warm weather in February or March: at all events they are always roused from their sleep by the time the tree affords them the least portion of provisions or food. From the tree being thus so early infested it is materially injured. These insects feed on the buds as they break forth, and then prin-

cipally upon the edges of the advancing leaves; and when the leaves are sufficiently large, or at near their full size, they appear to be preferred before the younger leaves for the sustenance and residence of all the succeeding broods.

The early effects produced by their nibbling the young leaves causes them to turn quite brown and to shrivel at the edges, and the effects of their depredations at a more advanced stage of the leaf will readily exhibit themselves by the top side of the leaves turning brown, to the extent which the Spider has derived support on the under side of the leaf. The weather most agreeable or encouraging to their pursuits is dry, warm weather; cold and wet completely retard their progress, and compel them to retire and remain inactive. They are exhilerated to resume their attacks, although it may be only for a short interval by the presence of the all exhilerating sun's rays; and as a matter of course they prove far more injurious to this tree in dry weather than when it is wet and cold.

For their Destruction.—About the latter end of January, or the beginning of February, all the shreds may be taken off from such trees as have been annoyed by the Spider the preceding summer, or any other materials that may appear to harbour the Spider. Those which are to be used again should be put a few minutes into boiling water, and those not wanted or useless should be burnt. The motive for taking the shreds off now is to destroy the insects while they remain

torpid in them, and to afford a better opportunity for the Mixture to be applied in all parts necessary.

On a fine warm day, when the insects are chiefly out of their harbour, about twelve or one o'clock, at the fore-end or middle of March, or rather about when the bloom buds are pretty well swollen, but before the flower petals at all appear, the Mixture (No. 3) should be plentifully forced on with the engine, that all crevices and holes in the walls may be well filled with the Mixture, and so as to wet the tree all over as well as the earth adjoining the wall, and a little space from it. In three or four days after, or the nearest succeeding serene or sun-shining day, the Mixture, No. 5, may be applied in the same manner, which will be a means of meeting with those the former operation may have missed, and it may be used with greater safety as the bud advances to a state more liable to be injured, than the former preparation; but both must be avoided when the bloom is about to open and when fully expanded. If this performance should be neglected, much good may be done towards eradicating these little animal, by gathering off all the infested leaves, which will be spotted brown, as before mentioned, and which will be readily observed.

Also much good may be done for the destruction of both eggs and insects at the latter end of September, by gathering a great portion of the leaves, (minding in plucking to draw the hand

upwards, for if downwards there would be a danger of injuring the buds), and then applying freely the Mixture (No. 3) not weaker of the soap than there directed.

The Mixture (No. 5) might be used in the summer months with advantage for their destruction, but on account of there always being eggs, the operation would not be effectual, and as the former directions completely answer the end required, they will be found far more proper to be attended to.

As this tribe of insects, especially the latter described, have caused much injury, and interest for its eradication, and much doubt whether or no it ever will be destroyed, with advantage to the plant it infects, I may be allowed to request my friends to let due attention be paid to the above operations, and I trust it will be found advantageous, and prove its destroying properties. Immerse a few leaves much infested with the Spider all over with the above Mixture, and examine the leaves a day or two after with the microscope, this will suffice to prove the effect. It must be observed, that the eggs that may be on the leaves will not be destroyed by it, and therefore may, in a day or two, bring forth young Spiders, and make it appear not effectual; but I have no doubt the investigator will be sufficiently satisfied on finding the whole of the perfect insects destroyed.

Those trees growing in forcing houses are more liable to be annoyed by this species than the

trees unprotected by glass, on account of heat and drought being most congenial to their increase and habits. Before the commencement of forcing, all the trees should be unloosed, and the materials used in training be burned, after which the lights must be put on, and firing be carried on for a few days. Then, if possible, choose a serene part of the day, which will aid the firing to allure the Spider to quit its privacy or retirement, and this will be a proper time to wash the whole house, together with the trees, in short leaving nothing, not even the earth in which the trees are planted, without a good soaking of the Mixture, (No. 3); and to make it more sure of their destruction, it would be well not to spare a second operation in a day or two after. That being completed, the trees may undergo the necessary treatment of pruning and training. If plants of any description, in the vicinity of the house, should have been visited by them the preceding summer, it is not improbable but some may be lodged about the outer walls of the house, and it therefore would be of service to pour the Mixture upon them, as no doubt many of them would contrive to get into the house if not destroyed. Boiling water may be used on the bare walls, and on the most useless parts of the earth. It would not be well to put the hot water upon the tree, as it would be attended with some degree of injury, especially to the young wood.

Several Recipes are communicated by various

authors for the destruction of these great vegetable enemies.

FORSYTH says, "Frequent watering of the wall and standard trees with lime-water, and throwing it plentifully on the underside of the leaves, where the Acarus is generally found, will, in a short time, extirpate that destructive insect." The solution is described in the preceding pages, for the destruction of the Aphis on plumbs.

HARRISON gives a Recipe to be applied in the autumn, for the destruction of their eggs, as follows:—"To eight gallons of water add one pound of soft soap, two pounds of common sulphur, and half an ounce of black-pepper."

ABERCROMBIE directs lime-water to be applied on standard and wall trees, in the same way as Forsyth, and also frequent washing with clear water in houses.

Clear water is almost universally adopted by gardeners for their eradication, and recorded by several authors, as being effectual for their destruction, among which are SPEECHLEY, WEIGHTON, NICOL, HARRISON, and many others.

The instruction given by FORSYTH and ABERCROMBIE renders us no useful information. Neither would the preparation do if ten times the quantity of lime was used.

HARRISON'S communications must be nothing more than supposition, or he would not have directed the egg to be destroyed when none, or at least but few, were in existence. Certainly if

there had been a time more pointedly specified for the performance, we should have been better able to judge, for, from one end of the autumn months to the other, it will be found, from the account I have laid down, the change of these animals is very material. At the fore parts of the months the perfect insect and egg exist on the leaves together, and at the latter end there are no eggs, and the insects have entered their retirement. At all events, if one of the ingredients recommended were used much stronger, viz. the soap to six gallons of water instead of eight, applied at a proper time, as I have before directed, probably it would be found useful for the destruction of the insect, but not the egg. The other ingredients, as I have said before, are quite useless.

The only benefit derived from water, so generally recommended for the destruction of these animals, as far as I can judge, will be this: From the time of its application, till the leaves again becomes dry, the Spider abstains from feeding upon them. But this can only be done to a certain degree, to be advantageous to the tree, which is better known by practical gardeners than myself, and, when properly attended to, no doubt but health and vigour will be promoted by it. So far we may pronounce watering to be good; but in respect to its being applied for the destruction of the insects, I cannot coincide with the numerous authors preceding me, and say that it is effectual for that purpose, but to the contrary.

I say water will not destroy the insect in the manner generally recommended; for we find, as soon as the leaves again become moderately dry, it renews its attacks. Besides, how is it that they survive the winter months? Can they escape the long-continued and heavy rains and snow which are common at that period, when their protection is nothing better than crevices in the wall and trees, and sometimes in the earth? And, I may say, that nearly half of the year affords them but little relief from damp, if not actual rain or snow, and yet, at the spring, as before mentioned, when the weather becomes animating, they do not appear, as generally supposed, dead, but actively wandering over the trees.

But it may be said some will be protected from wet deep in the wall and other concealments. This may be allowed; but on one occasion, when endeavouring to prove the effect of water, I macerated a number of the Spiders, *Acarias Telarius*, three hours with the leaf of a Peach tree, on which they were feeding, in clear water, without one being destroyed; and upon one occasion twelve hours, and yet some survived! and can it be supposed that those tenacious animals will be drowned with a shower of rain, or a good watering with the engine, when they escape destruction after being deluged so long under water.

THE THRIP.—The Thrip makes its attacks on those trees similar to the Spider, as soon as

the least verdure appears. At this time some are in the larvæ state, and others in the perfect state. The larvæ are long and of a faint yellow, and, when fully grown, nearly the size which they attain in their winged state, which is very small, but may be well discerned with the naked eye, especially when upon flowers which are, in dry warm weather, numerously infested by them, both in the perfect and imperfect state. They are furnished with six legs, and the emago, or perfect insects, have wings, which are very narrow, something longer than the body. They lie upon the centre of their back, so that the greatest portion of the body is uncovered by them. The two wings are divided a little, near their lower end. For some time after the insect attains to a winged state, it retains nearly its original colour, afterwards becomes nearly black, and in all stages of its existence, except when dormant through the cold months, which time it is concealed in the earth or crevices of walls and trees. It is very quick in motion when the weather proves favourable. I believe that one pair are the progenitors of several generations in one year. Their depredations are commenced at the spring, and are continued to the end of warm dry weather, upon various plants, especially on the blossom. They will be very commonly found both in their perfect and imperfect state, partaking with the Red Spider. On mellow Cucumbers, Vines, Kidney Beans, and many other Plants too numerous

to specify they are found in great numbers. The marks which they produce on the foliage from their bites are more in patches, and scollopped deeper than those produced by the Spider. They are very formidable enemies to this tree, when they prevail numerously. They commence feeding upon the edges of the young leaves as soon as they put forth in the spring, which causes them to shrink up; and they also prey upon the bloom before it expands, as well as afterwards. They feed in the interior or fructification part, which weakens it very materially, and causes the blossom-bud to fall off before it is formed into fruit. They also continue to feed upon the leaves after they are at their full size, which cause them to present a very sickly appearance. These animals may be said to share with the Spider, as beforementioned, in producing those general misrepresentations, of the trees having been blasted by the cold winds, or, should a thunder-storm have visited the neighbourhood, it is not uncommon to attribute the disease to the electrical fluid, or to use the general phrase, to its having been struck by the lightning.

For their Destruction.—Precisely the same steps may be taken for the destruction of these animals as for the destruction of the Red Spider, upon the same tree.

As the Thrip, in both the larvæ and perfect state, will sometimes, in their hunting for food, meet with the Peach and Nectarine, when in a

ripening or ripe state, (as they enjoy most kinds of bloom) a row of flowers might be sown two or three feet from the wall, for them to feed upon, perhaps the Virgins Stock, or Convolvulus Minor, may be mentioned as being proper. On a fine warm day, when the insects are feeding on the bloom, the whole may either be well watered with the Mixture here before-mentioned, or pull the flowers up and destroy them.

Fumigation is also much recommended. HARRISON directs, as for the Green Fly, when in an active state, fumigation with tobacco of his own growing, and moist pea straw together, and apply the Mixture in autumn, which is mentioned on the Aphis attacking Peaches and Nectarines.

Nothing more can be said in favour of these directions respecting their utility than what has already been adverted to upon the Red Spider, as the effects produced are much the same.

PLANT LOUSE, (*Aphis.*)—This insect appears upon these trees as soon as their buds exhibit the least symptom of green. In point of shape and size it is similar to those described on Apples, but not of the same species, for those on Apples are oviparous at one time and viviparous at other times, while those generally infesting Peach and Nectarine trees appear to be always viviparous; for although we sometimes find Aphides' eggs on those trees, it is most probable that they are deposited by the offspring of some other perfect species, which happen to alight at the time of

emigrating from other trees or plants. It is certain that when the trees are infested at so early a period as already mentioned, they are not produced from an egg, as some authors assert; neither, as some erroneously believe, are they brought by the east wind. They are viviparously deposited by the imperfect or immature parent, which has survived the winter in the earth, or in crevices of trees, walls, &c. and which was impregnated previously to its retirement, for I find, in my memorandum for 1825, that the latter end of March, and beginning of April, was fine, warm, and sunny weather, which appears to have animated the Aphis to ascend the tree, where I found several large full grown ones on the 6th of April, upon the bloom and leaf buds, which were just bursting through their external cuticle or skin, from which they derived their support, and where they were surrounded with a numerous progeny; and although the progenitors at the first were but few, yet, from their incredible increase they would apparently soon have populated the trees. In a memorandum made March 10th, 1826, it appears that I found full grown Aphides on the bloom which was at that time quite green, with the exception, perhaps, of one in five hundred, which showed a little pink. It must be allowed, that were the first occupants produced from an egg, they could not have attained to their full growth, and, indeed, apparently to a size larger than common, by the 10th

of March, or even the 6th of April. If we may be allowed to make any comparison with the first cletch from the egg, which infest the Apple, there we find a period of near a month betwixt those leaving the egg and the second cletch being viviparously established, and this before the parent has attained half its growth. If we make an allowance for the deficiency in size of those on the Apples, and the period in which those on Peaches are stated to exist, we may, upon an average, (allowing there to be eggs) suppose those on Peach trees to be excluded from the egg in January, a period very unlikely for those little animals to be brought into existence, as there is then neither food nor warmth to keep them alive. Several generations are produced in the course of the spring months, the last of which appears to take flight about the middle or latter end of June. It is remarkable that the trees, from the said period to the month of September, should remain quite free, (or at least I never found it otherwise), and then again be visited by the same species in its winged or perfect state.

Those emigrants shortly after populate their new residence, and, when the parental office is accomplished, die. Their offspring feeds till, repulsed by cold and the deprivation of food, they are compelled to retreat for the winter months; but the returning spring stimulates or incites them to resume their attack, and prolifically establish their progeny, as before-mentioned in the

former part of this chapter. Their reign will be readily recognized by the exhibition of curled leaves and crippled young branches, which are caused by the insect lacerating them in procuring or extracting the juices from them; and when trees are numerously visited by them, their depredations not only cause the leaves to present an unhealthy appearance, but actually prove very injurious to the whole tree. The size of the fruit is diminutive, and in flavour worth but little; and I have known trees, thus infested, to be at least three years in recovering their proper health and vigour.

It is almost universally contended, and recorded by several authors, that the weakest trees, or weakest parts of trees, are principally attacked in preference to the more luxuriant. These are opinions with which I certainly cannot coincide. My investigations have led me to believe, that the most healthy parts are equally liable to their attacks; and I think it is probable that those misapprehensions may arise from neglect of more close observation, and rest only on the supposition that because the weak suffer the most they must be most resorted to. If, however, we suppose the weak and the strong to be equally attacked, we shall find, as a matter of course, the effect of the depredations will be much sooner and more plainly exhibited on the weak than upon the strong; for the latter must afford a greater share of provision to their depredators, and

therefore be longer in coming into that dilapidated state which the former assume; and it may be further added, as a greater proof of a misconception, that, as the trees are first populated by only a few progenitors, they do not become generally attacked, and those parts where the parent happens to establish her progeny, (though equally healthy as any other part) soon become numerously infested so as to completely stop their growth, which, I need not add, produces debility or weakness. In the mean time, those that happen to escape remain healthy till they become possessed by some succeeding generation. If my readers would investigate for self-information in this matter, they would find more satisfactory proofs than what I can here advance.

FOR THEIR DESTRUCTION.—The following practice may be adopted: From the middle to the latter end of September all the ripe leaves, or as many as can be pulled off readily, may be taken off and burned, then the whole tree may have a good washing with the Mixture (No. 3) letting a man or boy at the same time be using the wisk, always forcing it upwards to assist the Mixture to wet every part of the tree properly. Also a spring watering with Mixture (No. 1) must be attended to twice by the time the blossom begins to appear or burst its outer envelopments, and as it is probable the trees may be infested later on in the season from some distant travellers, or from some of the surviving ones, which

may have escaped, the Mixture (No. 1) should be applied.

DESTRUCTION OF THE APHIS IN THE PEACH HOUSE.—The Peach house must also be washed with the Mixture, after taking off a principal portion of the leaves, from the middle to the latter end of September, and again just before the buds break forth at the spring, as before described, on the wall trees, or the house may be smoked in the spring, or at any time required, three succeeding nights, with damp tobacco. This must be done by providing two or three iron pans with small grates at the bottom. Put in them a shovel full of hot cinders, having had the tobacco or tobacco paper previously damped in tobacco water, or other water. Put about 4 oz. in each pan. Spread over the top of the pan damp hay, green grass, or any thing else sufficient to prevent the tobacco blazing; 12 oz. or a pound will fill a moderate sized house with smoke, or the smoking bellows may be used in place of the pans.

HARRISON recommends the destruction of eggs as his best practice, as will appear from the following quotation: "At the end of the year a small black Fly may be observed removing in every direction about the trees. The Fly is at this time depositing its eggs in the trees. To destroy these eggs is the best practice that can be adopted to get rid of those insects. This may be done by carefully applying composition in autumn, as directed for each sort of tree." Then for the

above trees he says, " To eight gallons of water, add one pound of soft soap, one pound of common sulphur, and half an ounce of black pepper."

Mr. Harrison also recommends two other methods, one of which is dusting the branches and leaves with snuff or tobacco dust, done on with a dridging box; the other is, to " make a fire of moist pea straw and tobacco mixed together, at a few feet distant from the trees, providing the wind is in a proper situation to direct the smoke to the tree, otherwise a cloth must be fastened over the tree, and smoke be introduced underneath it by means of a proper smoke bellows. Immediately after the smoking has been performed, let the trees have a forcible washing by means of a syringe or garden engine. After the smoking and washing have been performed, let the soil underneath the tree be trodden well or beat with a spade, otherwise a slight sprinkling of boiling water be poured over it, in order to destroy those insects which have been dislodged and fallen to the ground."

FORSYTH recommends for their destruction 32 gallons of water to one peck of quick lime, to be stirred up three or four days previous to using it.

BEATTIE, in his communication to the Caledonian Horticultural Society, recommends one peck of unslacked lime, put into a hogshead filled up with water, and allowed to stand 24 hours. It is then to be drained off; and half a pound of common soda, such as is used for washing, is

to be added. Twice or thrice watering with this liquor, he says, will destroy the vermin.

In Sir G. S. Mackenzie's observations to the Caledonian Horticultural Society, after remarking, that of all the Recipes that have been announced, there is but one substance that can be applied with effect and safety, and that is smoking of tobacco, goes on to say, "the easiest method of applying it to the trees on the open wall, is to hang over them mats or common sheeting, to confine the smoke."

Mr. Carr, of St. Ann's, communicates a similar practice to the Caledonian Horticultural Society. He says, "when the trees are troubled with insects, (I suppose meaning the Aphis), fumigation is resorted to. Previous to this operation, a large piece of convas, which has been saturated with oil, and almost become oil-cloth, but is more flexible, is suspended by hooks to the top of the wall, and held close to prevent the escape of the smoke. Its size may be about four yards and a half broad, and five and a quarter long. This oil canvas suits also for dwarf fruit trees during fumigation, and this affords a very expeditious method of clearing them from insects."

Weighton says he keeps them under by proper watering with the engine, and by plucking off the first buds on which they appear.

Mr. Parkes, F.L.S., in a letter to the Caledonian Society, in which he is endeavouring to establish common salt as a very valuable article

to the Horticultuist, says, in one instance, that "the Honey Dew, which every year makes great havock with fruit trees, is occasioned by small insects, and this may be prevented from appearing by strewing the borders where the trees grow with common salt." Mr. PARKES also gives an account of Mr. HITT recommending, in a publication more than fifty years ago, common salt. He says, after detailing the injury caused by the Honey Dew, "if the season be wet, spread common salt all over the border, about eight ounces to each tree, for the more salt the trees contain, the young branches will be more compact, and smoother the leaves will be, and thereby less subject to the penetration of the Honey Dew. If trees are thus ordered at all times when the Honey Dew appears on them, neither it nor the Smother Flies can ever do them much injury." In speaking of old borders, which are weakened by vegetables growing upon them, and if the weather is dry, he directs them to be watered plentifully three times a week, with one ounce of salt added to each gallon of water, and when the fly is strong, he recommends double the quantity of salt and water to be applied at the bottom of the trees. He says, "I have found these methods successful, even when the flies have been very strong upon the trees, and have, in a few days, destroyed many of them, and caused the trees to shoot vigorously." He also recommends, in obstinate cases, two ounces of

salt in one gallon of water, and to brush the trees all over with it.

Mr. HARRISON's receipt for the destruction of their eggs will avail nothing; for, providing there was eggs produced by this species, (a thing I very much doubt, as adverted to a few pages preceding this) the ingredients he has laid down are not likely to destroy them, as we find they will not destroy those eggs which are produced by those species of the Aphides which produce eggs, and it will be a great chance if they meet with the insects themselves, if put on after all the leaves are off the tree, as will be seen by referring to the description of their process, I would just observe that, providing there are eggs produced from this species of the *Aphis*, they are not produced by the Fly seen in the autumn months, as Mr. HARRISON supposes, for it is clear the perfect insects establish their progeny viviparously, as before related, and if eggs are produced it will be from their immature progeny.

The tobacco dust or snuff will destroy the insects; but the process is tedious, especially upon a large scale.

Smoking, as severally directed by HARRISON, MACKENZIE, and CARR, will intoxicate them, and not prove quite so effectual as done in forcing houses, on account of the smoke escaping much sooner, so that many will fall to the ground, and will again recover. It is therefore necessary to destroy them while on the ground, as

HARRISON directs, with boiling water, which will be preferable to his other method, crushing them with a spade.

FORSYTH'S lime-water, I am sorry to say, does not prove effectual, for had it done so, we should have been in possession of a cheap remedy.

BEATTIE'S method, though it may be justly said to be an alteration upon Forsyth's original, we cannot say claims any merit, for it is void of the necessary qualifications.

WEIGHTON'S plan of watering with the engine (I suppose with clear water, as no other ingredients are mentioned) has no effect whatever, either to destroy the insect or retard its progress. DR. REES gives an account of some having been "immersed with the plant which they were on all night in water, after which they survived," which will suffice to show the effect of washing with clear water; and his plan of picking off the young shoots would destroy many; but if they are always to be picked off when the trees are numerously visited, I must say, with the old proverb, that the cure would be worse than the disease.

PARKES leaves us to find the quantity of salt to be applied, and the time of its application, but the other part of his letter, where he quotes HITT'S practice with salt, tends to throw some little more light on the subject, from which we may infer that the salt water, and the salt when

dissolved in the earth, is intended to circulate with the sap or juice over the tree, and from the Smother Fly, (meaning, I suppose, the *Aphis)* feeding upon the sap thus blended with salt, is thereby destroyed. Certainly it must be erroneous to suppose that so small a quantity of salt, or salt water, mixed with so great a portion of earth as compose the borders suitable for those trees, should have the least tendency to destroy those insects while drawing out the sap from them, of which salt must only constitute a very small portion; and we find the salt water, directed to be brushed on the tree, will not destroy them, which is far more likely than the plan just mentioned, for it is almost impossible for them to escape, receiving it both outwardly and inwardly, if they feed at all after the application. At any rate, as the salt water proves so injurious to the leaves, no doubt can exist of its being far the best plan to abstain from using it.

The fruit is much annoyed by various insects about the time of ripening. First of all by the Wood-Louse *(Oniscus)*, a well-known insect, which is commonly found lodging among decayed wood, in bark pits, under old walls, &c., and at the time above-mentioned commits great depredations. One species, which appears lurking most about those trees, is flatter than the other species, and of a dark grey and buff colour mingled together. It is also more active, and not quite so shelly as the other one. The one most common is

a sort of lead colour, the back of which is shelled and annular jointed. When alarmed it has the power of rolling itself up perfectly round; and when full grown it is about the size of a moderate sized pea. It breeds very numerously about June. Both those species lodge in holes in the walls, or in the earth close to the wall. About the time the fruit begins to ripen those insects commence feeding upon it, and soon disfigure the fruit, especially that part nearest the wall, by scooping large holes.

FOR THEIR DESTRUCTION.—About the month of May pour boiling water, without a rose, along the wall side. Again, about three weeks or a month before the fruit begins to ripen, form a narrow drill, about two inches deep, close to the wall, lay therein a little straight straw, not more than will fill it nearly level with the surface. Eight or ten garden bean straws thick would be preferable, as it affords them food as well as shelter. It must be minded to bruise it previously to being laid in, so that if the insect should get into the inside, the following practice may be properly accomplished; and as a further allurement, it would be well if old cucumber leaves could be procured, and laid upon or among the straw, and here and there a little withered grass, or any other decaying vegetable, as they prefer food on the decay to its being healthy growing. If needful, water the straw twice before the fruit is ripe, sufficiently to scald through all the straw, with a water-

ing-pan, having an open or coarse rose, in a manner to reach the vermin effectually; and should they not have been destroyed previous to the time they attack the fruit, they will be found either lodging betwixt those they attack and the wall, or under leaves that are close to the wall, or in holes in the wall, immediately in the vicinity of the fruit. It will be proper to search for them in such places, and destroy them with a knife, or something thin, to put behind the fruit.

THE EARWIG, *(Forficula.)*—The Earwigs commence their ravages about the time when the fruit is nearly ripe. These animals have existed from generation to generation, as a terror to many people, from the idea that if possible they will make their way into the ear, and produce deafness. No further description is therefore necessary to indicate the insect. They lodge through the winter months deep in the earth, in dry situations, under the bark of old trees, walls, &c., and feed through the summer on the heart and flowers of different plants, where many conceal themselves through the day-time, and resumes feeding in the night. They are no doubt attracted to the Peach and Nectarine trees by the scent of ripening fruit, concealed near which they are found. They are as injurious to the fruit as Wood-Lice, and produce a similar effect on the fruit.

FOR THEIR DESTRUCTION.—Before the fruit is likely to be attacked hang up in different parts in the tree, close to the wall, old cast off stock-

ings, or any sort of woollen cloth, minding what is used be crumpled a little together, that cells or concealments may be formed for the Ear-wigs to secrete themselves.

Bundles of bean straw, about eight or nine inches long, and eight or ten straws thick or in number, tied together, and hung in various parts of the tree, close to the wall, also afford them a desirable shelter. It will be proper to examine the lures every two or three days, and immerse the whole in scalding water. If this has been neglected till they are fixed under branches and leaves as above, straw might be laid in a drill, (as directed for Wood-Lice), then go over the whole tree, moving with the hand all such places as are likely for them to lodge in, which will cause them to fall down and retire under the straw, which affords a good opportunity to scald them, as directed for Wood-Lice.

These trees are not so liable to be attacked by Caterpillars as the generality of trees, but they are frequently annoyed by one species, which stations itself early in the spring. It is of a dark grey; attains to about an inch and a half in length, forms a chrysalus at the fore-end of June, which produces the perfect insect, I believe a species of *Noctua*. This is a pretty large moth, variously marked with buff lines; the ground colour is brown. It establishes its progeny in August, in different plants, where they feed till about the latter end of September, on leaves of

young shoots, about which time they retire, and conceal themselves in the earth and in joints of the tree and chinks of the walls.

At the approach of spring they ascend the trees, as soon as they will afford them any support. Through the day-time they retire into concealments similar to the above, behind the branches, and under leaves and fruit. Their depredations are sometimes of a serious nature. They prey upon the leaves and young shoots, which they completely shear off, and are also destructive to the fruit at the fore end of its growth. They generally keep to one neighbourhood after they get fixed, that is, they feed near their retirement.

It will be necessary to examine for about a foot or eighteen inches round about the places where their marks appear, behind the branches, in crevices or hollows of the walls, and under the leaves where they conceal themselves. Owing to their being stretched at their full length, and of so dingy a colour, it requires the minutest search to find them out. I need not add, when they are found kill them.

THE WASP, *(Vespa Vulgaris.)*—Those fruits afford delicious food to the Wasps, and in dry warm weather, when they are numerous, which is too commonly the case, it will be difficult to produce any perfect fruit.

FOR THEIR DESTRUCTION.—A short time before the fruit ripens, a quantity of sour ale or beer, (or if not sour it will do, only the

former is more attracting), sweetened well with treacle, or sugar of the commonest kind, should be put in bottles that will contain a quarter or half pint each, such as are used by doctors. Half fill them, and hang in each tree from four to eight or more, according to the size of the tree, so as to be dispersed pretty equally all over it. The Mixture must be changed once a fortnight, as by that time the stench of the dead ones will prevent others entering the bottle. The bottles should hang perpendicular to prevent the Wasps walking up the side to make their escape.

The nests of Wasps should be sought for. This would perhaps be best accomplished by Under-gardeners having something allowed for every nest they take.

The Wasps may be destroyed in the following manner:—From half an ounce to an ounce of gunpowder must be mixed up with a little water-like paste, to form what is called a squib of a pyramidical or sugar loaf shape; when nearly half dry, the small end must be lighted, and put downwards into the hole, which will, if properly prepared, spark away in the course of a minute, but after it has got well hold, cover the hole with a sod or earth, which must be previously ready, to keep in the smoke. They will be completely destroyed in a few hours. The most proper time to perform this will be in the evening, when they are all retired from their labour; or on a rainy day, most of them will

have retired into their cells, which also would be a proper time for the performance.

THE LARGE BLUE FLY, *(Musca Vomitoria,)* also share in partaking of this fruit, and will require the same allurements as those laid down for the Wasps. If fruit is to be preserved perfect, I should farther recommend, to prevent Flies and Wasps, especially for the finer fruit, that bags should be made of foundation muslin, which may be obtained at from twopence to threepence per yard. In forming them they should be cut completely round, the size which is necessary to just cover one fruit, and made to draw up at the top on the readiest plan. One yard will make about nine or ten bags. A woman will make about twelve in one hour; the cost therefore will be about fourpence per dozen; and if kept dry through the remaining part of the year, when they are not in use, will last at least three or four years. In covering the fruit the bag must be drawn round its stalk sufficiently to prevent the Fly or Wasp entering into the bags. Then hang the band upon a nail, that if the fruit should fall off, it may be caught in the bag, and prevented from being the least bruised, on account of which the fruit will keep several days longer, as well as retain its beauty. When we consider the valuable services of these bags the expense and trouble of them will no doubt appear but trifling.

The ANT *(Formica)* also is fond of this fruit. If they become troublesome, the branches and

leaves which are in clusters should be moved; in short, the whole of the leaves would be better to be moved, that the Ant may be dislodged and fall to the ground, having the lures previously formed by straw, as directed for Wood-Lice, where they may be scalded, and a few holes may be bored in their nests, or turn them up with a fork, then pour amongst them boiling water.

APRICOT TREE.

LARGE SCALE, *(Coccus.)*—This insect makes its attack about the latter end of July or beginning of August. At this time it is of a flat oval shape, furnished with six legs and two horns, similar in size and shape to a Red Spider, and wanders about a few days to make choice of a permanent situation, and, when it is obtained, it adheres close to the branches. As it increases in size the insect becomes more unshaped, and apparently quite torpid. A sort of shell is gradually formed over it, the edges of which are cemented to the branch. At the time it is full grown, the appearance of legs and horns, and all the features of a living insect, are completely lost. About May following it gradually rises to a round brown varnished lump, and about the size of a moderate sized pea, which appears to be a preparation for an increase. About this time she quits a number of eggs, and in the inter-

vals between this time and the young issuing from the eggs the parent dies, and is mouldered to dust, in appearance like flour. In a short time after the young ones attain animation, they work their way out of the shell by perforating round holes, and then quit their dungeon in pursuit of a more lively and fertile residence. The male has wings, and its life is only of a short duration.

These animals prove very injurious to the trees, from perforating the cortex with their probocis, and drawing out the juices from the branches, and when the branches are numerously infested, the bark becomes confined, for their adhering so closely to the branches naturally prevents a free circulation of the sap.

FOR THEIR DESTRUCTION.—Immediately after the fruit is gathered, or about the middle to the latter end of August, will be a proper time to wash the trees well with the Mixture (No. 3) as the insect will be more readily destroyed at that time than any other, on account of there not being as yet any shell formed for their protection.

THE SMALL SCALES may be destroyed as on Pears.

The various CATERPILLARS infest this tree much in the same manner as on Apples, Pears, Plums, &c.; the same means therefore may be used for their destruction.

Should these means not be attended to till it is impossible to use the Mixture, all such leaves as are curled up or drawn together by their

silken cords, may be crushed between the finger and thumb, so as to injure the leaf as little as possible, and yet sufficiently to crush the Caterpillar It will be best not to pull the leaves off, as it proves injurious to the buds with which they are connected. Neither will there be any need to open the leaves, as it would give too much trouble.

The MEALY LEAF LOUSE sometimes attacks the Apricot, but not generally. It will be proper when they appear, to wash the trees with the Mixture as directed on Plums, any time except when in bloom, or when the fruit is ripening.

For the preservation of fruit, *see on Peaches, &c.*

THE GRAPE VINE.

LARGE FLAT SCALE, (*Coccus Vitus.*)—This insect is most generally observed first at the time when the parent expands to a considerable size, by preparing for the reception of her young, a cotton-like material, in which she envelops her eggs, to the amount of I believe not less than a thousand! at which interval, that is, about the middle of May, she raises herself from the branch, leaving the eggs among the cotton, which is very white and conspicuous, betwixt the branches and the shell or scale. After this the parent dies, and the young are brought forth about the middle of July. They are of an oblong shape, and wander about a few

days to suit themselves with a residence, mostly on the branches, but sometimes on leaves. They feed through the summer months, and a little at the fore end of spring, during which intervals they adhere close to the branches and leaves, and appear motionless.

A scale or shell is gradually forming over the insects, also the legs, from the swelling of the abdomen, become obscure, excepting so far as they appear only like transparent lines on the belly. The Scale attains to the size of about a quarter of an inch across by the time she establishes her progeny, and also at this time the scale is nearly round, and of a brown colour.

The males are few and small in size; they are furnished with wings. Immediately after copulation the male dies, as in all other species of the *Cocci* tribe.

It is not common for these insects to prevail predominantly, but when they do they prove very injurious to the Vine, by drawing out the sap, and very much dirty the stems and leaves with the fluid they eject, and besides this they have been known to disfigure the Vine as though it were covered with cotton. I remember an instance of this kind with some Vines in a gentleman's hot-house, near Leeds; the Grapes appeared to be rendered useless, as well as the Vines exhibiting a dirty and disagreeable appearance.

FOR THEIR DESTRUCTION.—The latter end of July will be a proper time to apply the Mix

ture (No. 3) as there is no shell as yet formed to prevent the Mixture penetrating to the insect. It must be applied with a painter's brush all over the Vines, except the ends of the young shoots, which at this time are tender, and liable to be injured with the Mixture; or a still readier plan will be in the latter end of September, or sooner if the fruit be gathered, to apply the Mixture (No. 5) plentifully, with the engine, all over the trees. It will be proper to rake up all the leaves which fall, and burn them, as it is probable some may not be destroyed with the former operation.

Those in the Vinery may be treated in the same way as on walls, minding in both cases to burn the leaves.

Peeling the Vines in winter will destroy many, if before neglected. The Mixture may be applied a little stronger at the last period, as the shell will then be harder.

MEALY BUG (*Coccus Adonidum*) described on Gooseberries, sometimes infests the Vine.

FOR THEIR DESTRUCTION.—Any time in the winter or spring months, before the buds break, the trees and walls should be well washed with the Mixture (No. 3), either by means of the engine or brush. It will be proper to peel the rough bark off, according to the common practice with gardeners, previous to the operation, to admit of the ingredients getting better to the insect. The peeling of the Vine should be carefully collected and burned, as many will be dislodged

from the Vines and remain in the bark; others will fall upon the ground. Destroy them by boiling water immediately after the operation.

The Vine-House, at the above period, must be well brushed over in all parts, where those insects are likely to secrete themselves, with the Mixture (No. 3), adding to five gallons, a quart of lineseed oil, or any sort of oil, that has not an unpleasant smell, or one pint of turpentine, to assist the penetration of the Mixture. The oil and turpentine must be left out when the Vines are to be done.

SPEECHLY recommends strong fumigation with tobacco, two or three times, at the distance of three or four days betwixt each operation, which, he says, should be done before the vines come into flower, as it proves injurious to the bloom.

M'PHAIL says, "if the Vine be much infested," (having previously mentioned Red Spider, Mealy Bug, and Brown Turtle), "after they are well washed with clear water, let the stems and all the branches be smeared with a Mixture of sulphur, soot, and water, put upon them with a painter's brush."

WEIGHTON, in his communication to the Horticultural Society, after observing that the White Bug, (meaning I suppose the *Coccus Adonidum*), is very hurtful to Peach houses and Vineries, further adds, "the cause of this insect making its appearance is much owing to the trees not been properly washed every day with the

engine." I suppose he means nothing more than clear water, as nothing more is stated. He further observes, "when a Vinery is overrun with the insect, all the old bark must be stripped off the Vines and all the shoots and trellis properly spunged over with black soap and warm water." He also recommends pieces of garden mat being tied round large branches of the trees; "about these, he says, the insects take shelter from the heat of the sun; every day these mats must be taken off and thrown out of the house."

Fumigation, as directed by Speechly, will not destroy those insects.

It is a mistaken notion of Weighton to suppose water will prevent those insects appearing, or how is it they always appear on Berry trees, out of doors, let the weather be wet or dry? His practice of spunging the Vines over with black soap no doubt would be found serviceable, providing he had directed a proportionate quantity of soap and water, and the proper time for its application, which is entirely neglected by this author. The mat tied on the branches, no doubt, will be of some service, but tedious, and not effectual.

Red Spider, *(Acarus Tellarius.)*—The Vine is very liable to be infested by these insects, for a description see Peaches and Nectarines. This animal is the greatest pest to which the Vine is subject. It appears to enjoy the foliage of this plant more than any other in the Vinery, for if any plant in the house is visited by it, we shall

be sure to find it on the Vine. From its perpetually preying upon the pulp and sap on the under side of the leaf, the Vine soon exhibits symptoms of bad health, by turning to a light brown on the top side of it, and it being an anxious pursuit of the horticulturist to perfect the fruit of this plant in flavour, size, and beauty, how commonly are his hopes and even his talents frustrated by the prevalence of this litle insect!

The last brood of those insects secrete themselves under the rough or top bark in the shreds, and crevices of the walls. After the Vines are peeled and unloosed, brush the wall and branches well with the Mixture, (No. 3), being careful to take and burn the refuse, and destroying those which fall on the ground with hot water.

The rafters of the Vine house, and all the parts of it, must be well washed with the Mixture, as directed for Peach houses. A pint of turpentine should be added to the five gallons, to assist that intended for the above performance penetrating the crevices in the wood, &c.

If the Vine should be overrun from any neglect in the above treatment, the Mixture of soap and water only should be carefully brushed on the underside of the leaf with a soft painter's brush. The old leaves, where the Spider is mostly to be found, will bear the Mixture, but the tender shoots and leaves are a little injured with it; therefore as those parts are not infested by the Spider, it will be of no use applying the Mix-

ture. This appears rather a tedious process, but if carefully applied, it will be found effectual to the destruction of the living insects; but as there will be part eggs which will have escaped being crushed, it will be necessary to repeat the operation in a fortnight or three weeks to destroy the young, after leaving the egg. A boy will readily perform the operation. The leaf must lay with its surface on the hand, with the underside upwards, then, after dipping the brush in the Mixture, draw it lightly all over the under side. The Mixture must be quite warm throughout the process, or otherwise it will remain too glutinous on the leaf, and not be quite so effectual.

While I am on this subject, I may observe that I cannot agree with those Horticulturists who are so much afraid of growing Kidney Beans in Graperies or hot houses, under the idea that they are productive of the Red Spider. It must be erroneous to suppose these plants produce the Spider, without a parent, and as to the plant being subject to the spider, that must be allowed. But if this plant was not in the house, the Vine or other plants would no doubt receive a greater share or number of the Spiders, and therefore, in direct opposition, I would say, if they are preferred by the Spider, grow them to afford provision to the proprietor and Spider both, and when the crop is reaped, burn the plant, that its inhabitants may be destroyed, and thus the house would be relieved of a great number of those vermin, which otherwise

would remain. I may further say, that it would be worth while to grow them, if they were for no other purpose than to attract the Spider, for the purpose of destroying them, and keeping them from other plants.

SPEECHLY assures his readers, from many years' experience, he has found the following method effectual and satisfactory in every respect: "To one pound of flour of sulphur, put two ounces of common Scotch snuff (very good tobacco dust will answer equally as well.) Let these be well mixed together; then take a small painter's brush, dip it lightly in the sulphur, then lay one hand on the upper surface of the leaf, and with the other draw the brush very gently backwards and forwards all over the under side; by this means a little sulphur will be left on the leaf. The Acarus, being soft and delicate in its nature, is hereby destroyed with the most gentle touch. The brush also most readily wipes off their web, as well as their globular transparent eggs, and thus we are secured from the danger of a succeeding brood.

NICHOL recommends, after every winter's pruning, the following Recipes: "Soft soap two pounds, flour of sulphur, two pounds, leaf or roll tobacco two pounds, nux vomica four ounces, and turpentine, an English gill, boiled in 8 English gallons of soft water to six. This composition to be laid on with a painter's brush, or rubbed on with a sponge, carefully anointing every branch, shoot,

and bud, being sure to rub it well into every joint hole and angle."

The principal and only utility derived from the former of these Recipes, towards the destruction of the Spider, will be, that in performing the operation, some insects must perish by being crushed with the brush, but those forced off by the brush unbruised, if they are not able to find their original residence, will attack some other plant.

The snuff and sulphur will not destroy those insects. They may be partly hindered for a few days feeding so voraciously on the plant, if much of the dust remains, but they will, in their labours, soon clear a place for their abode and provision.

The Recipe by Nichols is very likely to be of service, providing it is not too strong for the buds; and I think care should be taken not to apply it when the buds are breaking or advancing in growth; the sulphur might be dispensed with, as it is quite useless, and moreover it causes an obnoxious smell in the house for a considerable time. In short, I believe the principal ingredients in this case are the soap and turpentine, as at this period the Spiders are dormant, and therefore as no food is taken, they cannot be poisoned by any ingredients they might partake of when feeding, but the ingredients must have the power of entering the body, and thereby destroying them.

Water is also universally recommended for their destruction, but only proves a preventative, while the greatest portion of wet remains; it is therefore unnecessary to apply more than what is wanted to encourage vegetation.

APHIDES.—Some species of the Aphides occasionally attack the young shoots and foliage of the Grape Vine, but not commonly.

FOR THEIR DESTRUCTION.—Apply the Mixture as recommended for Peaches, or fumigate the house with tobacco. See directions for Peach houses.

THRIPS.—The Thrips also will sometimes be found to attack the Vine. Let the same means be used as directed for Red Spider.

The fruit, when ripening and ripe, will frequently be much annoyed by Wasps and Flies. At such times the fruit should be covered with bags of a proper size, made of canvass, or a still finer and opener article, called foundation muslin, will be preferable, on account of its affording a more free circulation of air to the fruit. Bottles must also be hung up half filled with beer, sweetened with common sugar or treacle, which will be preferable to finer sugar, as the scent is stronger, to decoy them in. The medicine bottles should be washed before put to use, as the scent of the medicine, in most cases, would prevent them from entering the bottles. Care must be taken frequently to empty the bottles,

as the smell of the dead insects would also deter others from entering.

FIG TREE.

SPIDERS (*Acari.*)—This tree is liable to be attacked by the Spiders.

FOR THEIR DESTRUCTION.—Wall trees and those in houses may be treated as directed for Peaches and Nectarines. It must be observed not to apply the Mixture to injure the fruit. If it is essentially necessary to have recourse to it in summer time, brush it on the leaves with a soft painter's brush, as mentioned on the Grape Vine.

Should the tree be attacked by the Aphides, apply the first Mixture as fine as possible with the engine; or for those in houses, smoking might be had recourse to, in the manner described for forcing, or glass houses.

If attacked by the *Coccus Vitus*, as described on the Vine, or by the *Coccus Adonidum*, described on Gooseberries, the stems and branches might be brushed over after the leaf is fallen, at the back end of the year, or in the winter, with the Mixture (No. 3.) If annoyed by the Small Scale described on the Pear, apply the same Mixture carefully twice in the month of May, and the latter end of June.

Rats and Mice are fond of the bark of this tree, and it is not uncommon for them to destroy a great portion of it, by gnawing the bark from the branches, while protected through the winter with straw, or other covering, commonly used, which proves a complete harbour for those vermin. To prevent their depredations, apply thinly over the stem and branches the compost (No. 12) as recommended for preventing Hares and Rabbits. At the same time traps that are commonly used should be set to catch the Rats, also those should be set for the Mice as directed on Peas.

MULBERRY TREE.

Those Mulberry Trees which are against walls and in houses, are liable to be attacked by the *Acarus*, or Red Spider, which must be destroyed by the autumn, winter, or spring applications, as recommended for Peaches and Nectarines.

GOOSEBERRY BUSH.

VARIOUS CATERPILLARS.—The first I shall attempt to describe is that which is so destructive to the foliage of this bush. Early in the spring, as soon, or before the leaves are well expanded, the parent, (I believe *Tenthredo Flava)*, supposed by some to be the Scorpion-Fly, *(Panorpa Communis)*

deposits her eggs, sometimes to the amount of from thirty to forty in number, on the under side, upon the ribs or membranes of the leaves. They are cylindrical, or rather longer than what constitutes an oval shape, of a light straw colour, about the thickness of a small pin, gumed on the ribs, in rows, end to end, leaving a small space between each other. In this manner they wait the animating power of nature to push them into existence, which in a few days is accomplished, and immediately after quitting the shell they commence feeding in societies on the foliage between the veins or ribs. The first token of their existence will be found in a day or two by several round holes appearing, about the size and form of pinholes, where the little strangers are firmly fixed, and where each goes on consuming the part of the leaf in its possession, till the whole leaf is entirely dissected, leaving only the strongest membranes or ribs. At this time the society is broken up, and each occupant sets out in different directions, in search of a new residence, which is soon obtained, and it is not uncommon for several of these scattered brethren to meet again and regale themselves together upon one leaf. In taking possession they do not resume their former position, but fix themselves firmly on the edge of the grossy or healthiest leaves with their thoractic feet on each side of the leaf. In this position they derive their support, and continuing to feed almost incessantly, except they become re-

laxed or hindered, from excessively hot or dry weather, which apparently render their food unpalatable, in what way I am not able to judge. It is, however, certain, that wet or showery weather is far most conducive to their progress. The late dry summers serve to corroborate this, as we find gardens in general have been pretty free of this ravenous animal.

When they are full grown they are about an inch in length, of a dark green, thickly marked with black tubercles or prominent spots, in some of which are inserted two or three hairs, others having only one, which is scarcely discernible without the aid of a microscope. They have sixteen feet, exclusive of the three thoractic pairs. In about six weeks after their first appearance, or at the fore end of June, they undergo their first change, by retiring under the leaves of the tree, and under the leaves of weeds, where they slough or cast their maculated skin, after which they are of a pale yellow colour, blended with green. In a short time they conceal themselves about two or three inches in the earth, where they form to themselves a cocoon or case. It is in texture similar to thin writing paper, is of a brownish colour, composed of a slimy matter, produced from themselves, and, coated over with earth, forms a complete protection. The shell is of an oval shape, about the thickness of the first quill of a Goose, and about three-eighths of an inch in length, and the outside being incrusted

with earth, makes it almost impossible for any one to distinguish them from the earth in which they are concealed, unless they are previously acquainted with their form and appearance. They remain about four or five weeks undergoing the formation of the perfect insect.

In form, beauty, and activity, nature has displayed a wonderful change. The animal which once existed so ravenous, and so much the terror to the Horticulturist, and recently quite inactive, is now an active beautiful four-winged Fly, and of itself quite harmless; but not many weeks elapses before its descendants pursue the same ravenous course their parents did in the first stage of its existence; and these also, when nature calls them to retire for the purpose of going through the different processes, like their predecessors, retire into the earth, where they spend the dreary months of winter in the before described cell; and although the frost should be intense, or the weather wet, yet their protection is so substantial that we find they survive; and early in the spring, about the latter end of March or beginning of April, they emerge from their case to embrace that reviving period.

The body of the Fly is small, and about two-thirds the length of its wings; the greatest substance or thickness is the thorax or breast, where the legs are inserted; the abdomen gradually diminishing downwards to a point. It is furnished with six legs; a very small head, eyes,

prominent snout or beak, the eighth of an inch long, in miniature like the bill of a plover or peswet; and two antennæ or horns, better than twice the length of its beak. Its wings are transparent, clearly exhibiting the various membranes; both pairs of wings are irregularly maculated with twelve different sized and shaped black spots, some of which, towards the apex or upper ends, are scarcely perceptible by the naked eye. The four wings are equal in shape and size. The lower part of each is obtuse; the breadth gradually diminishes to a point, where it is inserted to the body, similar in shape to the wings of the House-Fly, but twice the length; the membranes are somewhat stronger and more numerous. The head similar in shape, not more than half the size, and the body little more than half the thickness of the House-Fly, but nearly twice its length; its body is mostly covered with the wings, but a little divided at the obtuse or lower ends.

The general habits of the insect in the perfect state, are obscure, shy, and harmless. The food is procured from the nutrimental parts of the blossom or juices of the foliage. It is so trifling, that no marks of depredations can be traced by the most minute observers. These insects are rarely to be met with by the careless, as they generally confine themselves to reside in bushes, which are well furnished with salubrious leaves; they are very shy, and active in escaping from thicket to

thicket. They principally establish their ova on the most grossy leaves.

The description of this insect will appear tedious to such as are acquainted with its processes, but after hearing so many inquiries and different opinions respecting the origin of these formidable enemies, it is necessary to describe it at full length. I have therefore given as clear a description as I am able to do, and should any one doubt the assertion, or be wishful to ascertain the truth, it may be readily done by putting a few of the full grown Caterpillars into a small garden pot half filled with earth, at the same time putting a few twig ends of the Berry bush, furnished with leaves, to serve them to feed on a few days, in case they should not be ready for their change. Cover the pot over with a piece of canvas or cloth, tied round the pot, to prevent them or the Fly escaping, which should be examined frequently to ascertain when the emago comes forth.

In respect to the injuries produced by the Caterpillar it will appear almost useless to enumerate them, as they are so universally felt and understood; but I would briefly observe, that the Horticulturist, especially the sale Gardener, has not an enemy from the insect race which he has to dread more than the animal in question, when the weather is favourable to its progress, that is, cloudy and showery. At such seasons it is not at all uncommon for gardens, decorated with thou-

sands of those bushes, to be completely divested of their foliage, when, or before the fruit attains to half its size, which exposes it and the branches to the weather, so as greatly to retard a proper flowing of the sap, and naturally to render the fruit almost useless. The tree also is so much injured, that, after being once stripped of its verdure, the best efforts of the exhausted trees will not produce its former splendour for that season; and should the same tree, or even one not before attacked, be thus deprived of its leaves by the latter brood, no fruit must be expected the following season, and even the season succeeding that the tree will exhibit much weakness. Trees much infested two seasons together, although they may survive, will remain in a state of dormancy for several years after; the new shoots will be weak, and the fruit small and few.

This formidable animal has caused innumerable means to be tried for the preservation of this useful Bush from its destructive ravages, and yet no satisfactory discovery has appeared to the public; and I may say a discovery for its eradication has caused me more anxiety than any other remedy.

For their Destruction.—The following are the best means which I have been able to hit upon, and which I trust will prove essentially beneficial for what they are designed. The trees should be carefully and frequently looked over, and if the Caterpillar is likely to prevail predominantly,

the Mixture (No. 3 or 5) may be applied quite warm with the engine all over the Bush, early in the morning, or after six o'clock in the evening. In order to save the Mixture it must be put on as fine as possible, at the same time minding to use the wisk, by one or two attendants in the operation.

The Caterpillars are far more readily destroyed while young than when full grown, as at the latter state of their existence they may remain a considerable time apparently dead, yet will recover and again attack the tree, therefore the best way will be to destroy them at their first appearance on the Bush.

The Recipe, (No. 4), is not so effectual for the destruction of these animals. Yet it may be preferred to the above remedy, on account of its cheapness and its harmless properties. It appears not to be the least detrimental to the tree or fruit, and, as we find the ingredients very commonly taken or sucked by children for pleasure, and used in a similar way by people for medicine, we may confidently affirm, that should any fruit be taken from the tree, and eaten, the partaker thereof will sustain no injury thereby; yet, as fruit is much better without any thing we can add to improve its taste in this way, when it is wanted for the table, I should recommend to avoid watering at that period. As soon as the little animals appear and exhibit symptoms of being prevalent, which will be discovered by nu-

merous round holes, as before-mentioned, the tree must immediately be well watered with the Mixture. Repeat it at times when it is needful.

This Recipe does not so immediately destroy as the former, but its properties are an efficacious remedy, to prevent these voracious animals from feeding; and when it is applied when the Caterpillars are young, they will gradually pine away, before they will either attack the leaves thus watered or any other plant. Those which have attained to their full growth, or nearly so, I believe, after wandering about up and down the tree and on the ground for a day or two for food, will retire into the earth for their change, before they would have done had they not been repulsed in their natural course. It will be proper to repeat the watering in a few days, for should any leaves have escaped the Mixture, the repeated efforts of the Caterpillars to obtain food will not fail to discover and fix on such leaves. Heavy rains will wash the allum off, therefore it may be necessary, on those occasions, to repeat the application.

The following method may be advantageously adopted:—Take a piece of harding, or pack sheet, about two yards square, slit it up from the edge to the centre of the sheet, two men or boys, one on each side of the row of berry bushes will then be required to draw it round the trunk of the bush. One of the persons is provided with a strong forked stick, each thong about three or four inches long, to be wrapped round with

listing, mat, or any thing else to prevent the stick bruising the tree; or it would be preferable to have a similar thing to a hay-fork, with the thongs or grains about three inches long, but must be two or three times its weight, with a shaft two feet six inches long. After wrapping the iron round as above, sufficiently thick, the person thus prepared strikes the trunk of the tree three or four times smartly, or if the trunk is not sufficiently long to allow the performance, the stronger branches might be hit so as not to split them from the tree. This operation is performed most effectually when the sun is shining clear, at which time the Caterpillar adheres but slightly to the leaf, and on that account it is more readily dislodged into the sheet. Each person, after shaking or moving them from the slit in the sheet, in moving the sheet to another tree, must take hold of the corner, on the side opposite to that on which the slit is made. It must then be carefully drawn to the next tree, and so on from tree to tree, till it is necessary to clear the cloth. For which purpose a fire should previously be prepared for the reception and destruction of the Caterpillars, or boiling water might be poured upon them, which will answer the purpose effectually.

There are a great number of Recipes on record for the destruction of this formidable enemy, a few of which, in addition to those already mentioned, shall suffice.

FORSYTH recommends as follows: "Take some sifted quick lime, lay it under the bushes, but do not at first let any of it touch the branches or leaves, then shake each bush suddenly and smartly, and the Caterpillars will fall into the lime. If the bush be not shaken suddenly, the Caterpillar, on being a little disturbed, will take so firm a hold as not easily to be shaken off. After this is done, sift some of the lime over the bushes; this will drive down those which may have lodged on the branches. The Caterpillars ought to be swept up next day, and the bushes well washed with clear lime-water, mixed with urine. This will destroy any Caterpillar that may still remain."

HARRISON says, "during the winter season the eggs of the insects are deposited in crevices and joints of the trees, also in the ground. It is whilst they are in this state that my applications are directed. As soon as the pruning of the tree is completed, I have all the refuse shoots, &c. raked clear away and burnt. The trees are then washed over with the following Mixture: A good portion of quick lime is put into a tub with some water; in three or four days afterwards this is sprinkled over the trees. When it is taken out of the tub it is well stirred up, so that a portion of the lime is taken with the water. Immediately after this is done, a quantity of powdered quick lime is cast amongst the branches. Instead of this the trees may be washed with the following

composition: To 12 gallons of water add half a pound of tobacco, and six ounces of black pepper; these must be boiled together for half an hour, and when cold be used."

At the following spring, just before the trees come into bloom, he applies the lime and lime-water as above, taking care, he says, "to apply the lime well under the leaves, so that no part of the tree be omitted; also a little quick lime is spread over the roots of the tree."

Soon after the berries are set, he recommends the trees being smoked by "burning some moist straw near them, taking the advantage of a favourable day, so that the smoke will be conveyed to the trees."

MACMURRAY, in his communication to the Caledonian Horticultural Society, says, "in autumn let a quantity of urine be provided, and let a little be poured around the stem of each bush, as much as suffices to moisten the ground. This simple expedient has succeeded to admiration, and its prophylactic virtues have seemed to extend to two successive years."

Another method he also shows; that is, to "collect as much drift sea-weeds from the beach, when opportunity occurs, as will cover the Gooseberry department to the depth of four or five inches. Lay it on in autumn. Let this covering remain untouched during the winter months, and early in spring, as the season advances, dig it in." He supposes that the ova of the Moth are

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tions, they will be discernible as soon as they come to life, by eating holes through the leaves, and may be easily destroyed without the least injury to the bushes or fruit."

ELLIOTT adopts the following method:— "Take six pounds of black currant leaves, and as many of elder, and boil them together in twelve gallons of water; then take 14 pounds of hot lime, and put it in 12 gallons of water; mix them altogether, then wash the infested bushes and trees with the hand engine. After that is done, take a little hot lime, and lay it at the root of each bush or tree that has been washed, which completes the operation. He further adds, "when the foliage is off, stir up the surface of the earth, all round the roots of the bushes and trees, and lay a little hot lime about them to destroy the eggs. This I have never found to fail of success since my first trial, six years ago."

MACHRAY says, "Procure some tobacco and soft or black soap, and boil a quarter of a pound of tobacco, with one pound of soft soap, in about 18 Scotch pints of water, and keep stirring the liquid, while boiling, with a wisk, in order to dissolve the soap. This liquid, when milk-warm, or so cold as not to hurt the foliage, I apply to the bushes with a hand squirt in the evening, and in the morning I find all the ground under the bushes covered with dead Caterpillars."

My opinion here leads me to say, there is no useful information to be gathered from FORSYTH's

Recipe on this subject; but rather that it tends to produce injury, trouble, and expense. I suppose that the lime laid under the tree is intended to destroy those Caterpillars shaken off the bushes by falling among it, but I will take upon me to say, that not a single Caterpillar will be destroyed by the lime, for I have covered Caterpillars thickly over with quick lime, and still all have escaped. It appears also that the above practice is a superfluity of labour; if sifting of lime will send the remaining Caterpillars down, which could not be removed with the first performance, I should suppose it would have the same effect on sending the whole down as well as the few remaining ones, and thereby save the trouble of shaking the tree Again, if it requires lime-water and urine to destroy those that may still remain, I say, why not use it to destroy the great bulk? and save the trouble of all the former operations, and at the same time preserve beauty to the Bush.

The same may be said of HARRISON'S practice as of FORSYTH'S, except that there is a greater probability of lives being destroyed by Forsyth's plan than Harrison's, for at the period when he directs his method to be put in practice, there are neither eggs nor Caterpillars in existence. But allowing that those insects were in existence I would save my friends the trouble of using, or in finding out a proportionable quantity of lime and water which Mr. H. has omitted detailing for their destruction, for it is of no use for the above purpose. Also

the Mixture of tobacco and black pepper is quite useless. The tobacco might make the Caterpillars intoxicated, but they would recover in a short time. As for the pepper, I think it would not do more than make their food palatable, for I may venture to say the quantity mentioned would fall far short of seasoning a beef-steak pie, of a size requiring the same quantity of gravy as water here required to compose the Mixture, and if ten, or even twice ten times the quantity was used to the same quantity of water, it would not destroy them, and how much less useful it must be where half an ounce only is introduced to eight gallons of water with other ingredients for Peach and Nectarine trees. After the spring watering, a little lime is directed to be laid under the trees, but I am at a loss to know for what purpose. The smoking, it is possible, may be of some use, but I doubt whether it will destroy when applied in this manner.

I do not know any thing about the destroying powers of Cow urine, which Macmurray strongly recommends. If it has those destroying properties, it is probable the application may fall on some of the straggling Caterpillars, which may have only just left the bush to conceal themselves in the earth; but the principal bulk, at this time, will be coated over with a shell that would resist almost any quantity that might be applied, and at the same time the Caterpillar does not always retire immediately round the stem of the bush,

where the urine is directed to be applied, but mostly at a little distance from it. The sea-weed, I consider to be of as little value as the cow urine. In short, I may venture to say, that both the Recipes will be found to be of far more use as tillage than for the destruction of Caterpillars.

KYLES's plan of picking off the leaves, which exhibit small holes in them, I consider to be a useful practice; but as for the other method, which he calls a better way, that of watering round the bushes with cow urine, I think it of much less importance than the former. In short, I am unable to tell for what purpose it is applied. It cannot prevent the parent from depositing her eggs upon the leaves; or if it be intended to destroy the Caterpillar before it ascends the tree, as some erroneously believe, it will be in vain, for, at this time, no Caterpillars exist. At this period the parent is in search of a place to establish the ova of her progeny among the leaves of this bush.

GIBS's plan of digging deep I should think would be the means of preventing many of the Flies coming forth, by burying the chrysalis too deep for it to ascend to the surface, but there is a danger of the operation injuring the roots of the bushes. I should think Tweeds' method, communicated in a letter to the treasurer of the Caledonian Hrticultural Society, though a similar practice, much superior. He says, " In

course of any of the winter months, I pare all the earth from under the bushes to the depth of about three inches, into a flat ridge between the rows, and in the first dry day following I either tread, beat, or roll the ridges and trench the whole down one and a half or two spades deep, observing to tread the foul earth into the bottom of the trench."

Gibs's plan of picking off the leaves on which the eggs are deposited, appears to be a tedious practice. Indeed it would be far preferable to await the appearance of the holes being perforated by the first attack of those perpetrators, which will be readily observed by those in search of them.

I can form no just opinion of ELLIOT's Mixture, as I unfortunately have not tried it; but as for his method of laying lime round the roots, to destroy the eggs, it is quite erroneous. In fact there are none; and if there were any, it would, I believe, tend to preserve rather than destroy.

MACHRAY's Mixture is very likely to be invested with destroying properties, if it was not attended with too much expense. The several practices of dusting the trees with road and mill dust, &c. dirties them, and checks the bush in its growth, without being of any use in destroying the Caterpillars. As respects Hellibore, which appeared some time ago in the newspaper, as a good remedy, I find, on trying two ounces of powdered Hellibore, mixed with one gallon of

water, that it neither destroys them nor any other kind; four ounces to one gallon of water appears to banish them from the bush. This would be too expensive (I believe it is twenty-pence per pound) and dangerous on account of its poisonous properties.

CATERPILLARS of the Moth *Phalæna Wavaria*, a description of which is given on the Apple tree, sometimes prove very injurious to the fruit of this bush. They perforate their way into the fruit, by which means it is caused to drop from the bush. These depredators commence their ravages while the tree is in bloom, and continue pursuing them to the time the Berry is three parts grown; they will often be found in this way destroying the principal part of the crop.

There are two other kinds of Caterpillars which infest the foliage, and occasionally bore the fruit; for a description of which see Apple trees. They are seldom so injurious as the former.

FOR THEIR DESTRUCTION.—For the two last kinds use the Mixture (No. 3) at the fore end of September, which will be just before they retire to conceal themselves for the winter months; or, at the spring, when the fruit is just set, the Mixture (No. 5) should be used twice in the course of the same or the next day for the three kinds.

CATERPILLAR.—This species is commonly called Berry-bore, and mentioned by some authors as being a great depredator to the fruit of

this bush. For my own part, I do not remember that they ever prevailed to any great degree. Some few may be found occasionally among the Berry trees, but I do not think that they are particularly attached to the Berry, or even the leaf of this bush, more than any other plant. Whether, however, their attacks be upon the leaf or Berry, I am inclined to believe the injury is so trifling as not to require our attention. When the animal is full grown, it is about the size of the one so consumptive to the foliage, as described above. The ground or principal colour is white, thickly spotted with black spots, and it is commonly found stretched at full length on the older branches. This is not the only plant they possess. They are principally to be found in hedges, and on the undergrowths in woods, &c. for which reason I am surprised that it derives the name from a species of the Ribes, viz. *Grossularia*, or Gooseberry.

The larvæ retire through the winter under stones, rough bark, or some such concealment. Kirby relates that in the year 1813 or 14, which was one of the severest winters we have had for many years, he found a number of these Caterpillars under the projecting rim of a garden pot, only so slightly protected through the winter, and still alive and uninjured. They quit their retreats to feed in the spring, on trees, shrubs, &c. where they also form the pupa, at the latter end of May, or foré end of June, and in July produce

the Moth *(Phalæna Grossularia)* about the size of the lesser common white Butterfly. The abdomen or body is an orange colour, spotted with chocolate, and the wings are principally white, maculated with chocolate spots. The parent deposits her eggs some time in August, which, in a few days, bring forth the Caterpillar.

FOR THEIR DESTRUCTION.—If the trees should be much infested, it will be proper to water the bushes well in September with the Mixture (No. 3), or in the spring. Shake the trees as directed for the larvæ of the Tenthredo.

APHIDES.—There are two species of the Aphides which infest this bush; one of them is rather small in size, of a dark green colour, the other one is something larger, and longer in shape, and of a light green. Both kinds commence their depredations about one time. It appears also that both kinds are in the larva state through the winter, in the earth, under stones, leaves, and various other places of retirement. About April, those which survive set out in search of food, and appear chiefly to make choice of the twig end of the young wood of this bush, where they soon establish a multitudinous progeny, having been pregnant previous to their retirement in autumn. The acts of these depredators will be exhibited by the curling of the leaves and young wood. They very commonly prove to be very formidable to this bush, as they not only retard its growth very materially, but the fluid they eject so much,

dirties the fruit that it becomes nearly useless, especially if the bush is infested when the fruit is ripe. This appeared to have been the case in the year 1825, and that many hundreds of pecks were never gathered from the trees, and also many hundreds of pecks did not fetch in price more than half the value to the market gardener, in comparison to those gathered from the trees not thus infested.

This is the very cause which raises the opinion of so many people, that it is produced by the smoke of Leeds and its vicinity; and some of its inhabitants are so prejudiced to the neighbouring produce, that if fruit thus affected were brought from some gentlemen's gardens at the distance of twenty miles, the blame would be immediately attached to the Leeds smoke. Certainly we must not say that in the neighbourhood of so much smoke vegetation will be quite so clear and pure as, at a greater distance, but the difference is not so much as may be supposed, for the frequent rains and dews tend to cleanse it: and I may venture to say, that fruits and vegetables are produced, within the distance of two miles from Leeds, that are little inferior to those raised in any other part of Yorkshire; I mean where the same attention is paid to its culture. The year 1826, in May, nothing less than destruction to the crops, and great injury to the bush, were advancing by this formidable enemy, but Providence so ordered that

our friend the Lady-bird should be let loose among them in such numbers, that, by the middle of June, nearly the whole were repulsed.

FOR THEIR DESTRUCTION.—Apply the Mixture (No. 2.) In performing it play it as finely as possible upon the bushes, that the operation may not be attended with much expense; and at the same time, when the engine is working, it will be proper to have a person on each side of the row with wisks, beating the trees carefully, not to hurt the Berries, and yet to strike smartly on the twig ends, that the Mixture may be broke into fine sprays, and forced among the insects. To destroy them completely, a second watering will be necessary in a day or two.

As in all other cases of the Aphides tribe, the trees must be frequently examined, as there is a danger of the same species of Aphis emigrating from some other parts, and possessing those trees which have already been visited. If a few should escape destruction, their numerous increase would soon become predominant. If they should have been neglected till the trees and fruit become dirty, a good washing or two with clear water, after the insects are destroyed, would be of great service, but in extensive plantations the latter process might be dispensed with, as the whole operation, in such cases, would become tedious. Twelve gallons of the above Mixture will do for 60 or 70 middle-sized trees, if well attended to with the wisk.

MEALY BUG, *(Coccus Adonidum.)*—This species differs from the generality of the Cocci family. It is never found cemented to the leaves and branches, extinct in appearance of animation, as most of the other species, but from the time of its entering into existence to the time of its retiring to establish its successors, it is endowed with a roving privilege, except hindered by torpidness in the winter months. This, when full grown, is about the size of a small Wood-Louse of the lesser species; it is of an oval shape, furnished with six legs and two horns; the body is faintly divided into several segments. Its sides are a little fringed. It transpires from its body a white substance, which renders the whole body white, and gives it an appearance as though it had been dusted with flour. Hence it derives its name Mealy Bug; so commonly called. About the fore end or middle of May, it retires into joints, especially on the under side of the branches, and of the trunk of the tree, under the old or rugged bark, &c. where it forms itself a cotton or downy-like envelopment, and where, in a few days, each parent deposits from 60 to 80 eggs, and afterwards dies. The eggs are brought into animation about the fore end or middle of July; at this time, in some of the envelopments, instead of eggs, are found the perfect or winged insect, which is recorded by various authors to be the male; it is of a small size, and it is said that, after performing the offices of impregnation, the

male immediately dies. From the time these little animals quit the eggs, to about the fore end or middle of October, they derive support from the spurs and branches.

At the last mentioned period they become dormant, in which state they remain in crevices, or among the rough bark, till the latter end of February or beginning of March, apparently uninjured by very severe or wet weather. I found, on the 1st of February, 1826, after several days of sharp frost, those insects living. About the above period, if the weather proves mild, they are awakened out of their lethargy, and will be found pretty actively roving about in search of, as I suppose, the most suitable food, and there they feed till about the middle of May, when they retire to undergo their last process as before-mentioned. Their depredations are seldom extensive, or of much moment, yet they appear to enjoy this bush more than any thing else, except the Grape Vine, or at least I find it to be so among trees in the open air. Sometimes those kinds of Gooseberry bushes which they numerously infest and appear to enjoy most are materially injured by their perpetually lacerating the spurs and branches.

For their Destruction.—The Mixture (No. 3) may be applied any time from the middle of August to the latter end of September. As the animals lodge a good deal under the spurs and branches, care must be taken to apply the Mixture on such parts. It would be more com-

plete to give a second watering in a day or two, to destroy any that the Mixture may not have fallen upon. It would be a proper time also to water them on a fine day, at the fore end of March; or, at any rate, before the trees are in bloom, as at that time the fruit is tender, and therefore would be injured by the application; or a winter application would destroy all those which are not too much protected in their huts. In this case it would be an advantage to add to the Mixture, four pints of common fish oil, which would assist it to penetrate their cells.

RED SPIDER.—As all the species of this family, which appear to annoy vegetation, have so much the resemblance of each other, it will be needless saying any thing more respecting the form of them than what has already been communicated on one of the species infesting the Peach tree, *Acarus Holoscricius;* for so trifling is the difference betwixt those two, that it is quite imperceptible by the naked eye, and it must be an entomologist to distinguish the difference by the aid of a microscope. This animal will be found wandering, on fine days, over the bush, by the time the buds break forth; or, I may say, as soon as the least verdure appears, they make their attacks upon the buds, from which they derive their support, and sometimes reign to that degree, that from 50 to 100 will be found upon an unfolded bud, which was the case in 1825 and 1826, so that the trees assumed a scarlet shade.

After the leaf becomes a little more expanded, their abode through a fine day is on the upper side of the leaf; and towards the close of the day, or at the approach of rain they retreat, among the spurs, joints, and under the rugged bark of the bush, and amongst the union of the leaves, and sometimes numerously under dry clods of the earth in the vicinity of the bush. Thus they are alternately animated by light and heat, and relapsed by rain, cold, and darkness, till nature calls for them to relinquish their former pursuits, to establish the ova of their successor in those retreats or retirements which they themselves had previously possessed, after which they immediately give up, retire into the earth, and other places, and die. It does not appear from the first of their coming into existence (at the latter end of February to the fore end of June), when the egg is deposited, that there is any increase, nor are there any of the Spiders existing from the latter end of June till the above embryo is influenced to break forth into animation. It appears, from the above observations, that we have only one brood in one year from this species, while the *A. Tellarius* on Peach trees, and the species that infest Apples, are progenitors of several generations.

The pernicious effects commonly produced by this ravenous insect are very considerable, especially when the spring months prove warm and dry, an extreme which was produced in the spring of

1825. I find, from my memorandum, that the weather was generally pretty warm through the middle of the day, and very droughty from the fore end of March up to the 20th of April, and in all gardens that came under my notice, those little animals reigned most predominantly. The whole union of leaves and tender fruit became a prey to them; and what made the evil still greater, the surviving fruit became so much exposed to the spring frosts, that but few escaped destruction.

We find that the Berry bush escapes the annoyance of those little depredators, when the spring months are cold and wet, not because the Spiders are destroyed either by wet or cold, but that neither prove congenial to their habits, and therefore, at such seasons, they abstain from feeding, and retire, which must naturally afford an opportunity for the leaves to gain strength and vigour, independent of the advantage the trees derive from the rain invigorating the whole plant.

It may be supposed that their cells, or retirements prevent them from being destroyed, but in reference to that I would observe, that their protection is so slight, that the greatest bulk is exposed to the rain that may fall, and yet if the warm sun-rays, break through the clouds, and the foliage becomes pretty dry, though the rain may have been ever so intense, those little animals are exhilerated.

FOR THEIR DESTRUCTION.—About the

latter end of February, or beginning of March, or more properly just before the bloom begins to expand, or rather while the petals are folded up, the bush should be washed twice in the course of two or three days, with the Mixture (No. 3.) The middle of sunny or mild days should be chosen for the performance, as at such times they will be chiefly out of their retreats, which naturally affords a better opportunity for the accomplishment of their destruction. If through any neglect the performance has not taken place, it may be applied after the fruit is well set. To make the Mixture go far and to prevent extravagance press the finger tight on the engine pipe, and let it come out like fine rain. Two boys will be required to wisk the bushes with brooms or birch branches; twelve gallons will do sixty moderate sized trees; the whole may be applied in twenty minutes.

Birds.—Birds in the winter and spring months commit great depredations on this bush by unfolding the cortical part of the bud, and picking out the interior for their support, and from the scales or cuticles being left it in general assumes nearly its original form, except to the minute observer. Thus the proprietor of a small garden may be deprived of the greatest portion of his crop without knowing or having the least suspicion of the cause. The Sparrow appears to be the greatest enemy; the Bluecap and Spink also

take a share in the crime, but they are never so numerous.

The best method I have yet discovered to prevent the evil is to dust the bushes well over with quick lime, three or four times in the course of the winter and spring months, always taking advantage of a pretty still day to perform the operation, when the trees are quite wet after rain, or at the time when light rain is falling, that it might stick to the buds; or add one peck of lime to twenty-four gallons of water with two gallons of gas tar, stir all up together, apply it with a watering pan, furnished with a coarse rose to admit of the lime going through. It would be well to have the whole siled through a sieve first, that it may pass more readily through the rose. Or to feed the Sparrows regularly with any thing they would eat, and would otherwise be wasted, would be a good practice.

In quarters or general plantations of Berry Trees, a few stuffed Hawks might be set or fixed up, removing them occasionally, that they may not appear so common for the Sparrow not to fear them.

CURRANT BUSH.

The great and chief enemy to the Red and White Currant bush is a species of the Aphides.

It is considerably larger than those on Gooseberry bushes. In shape not so ovated, but both the head and hind parts are more gradually tapered to acute points than those previously mentioned are. It appears early in the spring, at which time seldom more than one or two are to be found on the under side of the leaf, where they appear to remain three or four weeks before any offspring are brought forth, previous to which they generally quit their former station, probably at the time of copulation, and principally fix on the ends of young shoots, where they soon viviparously establish a numerous progeny; and no doubt each parent is the progenitor of several generations. From the middle of June to the middle of July they generally arrive at the perfect or winged state, and emigrate into different parts at greater and lesser distances from their original abode. They then establish their successors, and I believe shortly after die. At the approach of winter, some of the latter cletch descend into the earth, and other concealments, and others deposit their eggs on the branches of the bush, which are brought into existence the fore end of April, about which time the others leave their concealments, and ascend the trees. Marks of the existence of those insects will be discovered generally from the curling of the twig ends and young leaves, but first more particularly from the tumefaction of the most grassy leaves, of which they are the real cause, and not

cold winds, an opinion long entertained by some gardeners. I remember when a boy, asking an old experienced gardener the cause of so many blistered leaves on the Currant trees; his reply was, they were crippled by the cold wind. If I had not been so easily persuaded, and examined for myself, I should have found in the concave of the leaf a sufficient and correct proof of the cause.

Many of the weaker leaves, in the middle of the tree, when the insects become more numerous, are also infested. But owing to the leaf not being so grossy they do not curl up in the same manner. In the year 1825, Currant trees, in most situations, were so much infested by those depredators that, from the foliage being deprived of its sap, and from the excessive power which the sun happened to have at the same time, in the middle of June, the greatest portion of the leaves became exhausted to that degree, that they fell from the bushes, and left them almost naked, and the fruit was not more than half its proper size, and from the fluid ejected by the Aphis falling upon it, was rendered entirely useless. In 1827 they were much annoyed, but not so much as in the preceding year.

The Black Currant is occasionally infested by, I believe, the same species of the Aphis as above.

For their Destruction.—It is a good plan to begin about the middle or latter end of

April to pick off all the leaves which are blistered and appear brown on the upper surface. At this time there will seldom be found more than one insect in each concave, but by those being taken off and burned, a vast increase will be prevented. It will be proper to look over them a second time at the fore end of May. If it is necessary, the Mixture (No. 2) may be applied any time after the fruit is well set to the time of ripening. Previous to the application, the twig ends, with the principal blistered leaves, should be picked off; a boy will go over from one to two hundred bushes in one day, after he is acquainted with the effects they produce. The Mixture should be then carefully applied with the engine over the Bush, and two boys, prepared with the wisk, must smartly and carefully wisk the bush upwards, and never strike downwards, as it would split the leaves, and break the young shoots. The wisk will break or disperse the Mixture into small particles, and at the same time it will be forced under the leaves, which otherwise would use several times the quantity without getting among the insects so effectually, and, of course, the waste would be much greater.

If the above practice be properly managed twelve gallons will do from thirty to forty large trees.

Root Aphis.—The roots of the Currant Bush particularly the small fibrous roots, are sometimes infested by a small species of the Aphides, it is smaller in size than any of the preceding ones

described. The body is of a buff or flesh colour, produces a cotton-like envelopment, similar to the *Aphis Lanigera* on Apples, and which probably might have been mistaken by SALISBURY for the *Eriosoma*, or Apple Bug, on the root of the Apple Tree, as I am almost persuaded that the Eriosoma, or, as it is now called, *Aphis Lanigera*, never feeds upon the roots, or at least after many investigations I never found any feeding, or the least symptoms of their having there fed. The attacks of the Root Aphis are generally from the middle of July to the latter end of September. At the last period they arrive at their perfect or winged state. They prevail principally in dry weather. Tokens of the visitations of these depredators are exhibited in the languishing or drooping of the foliage, occasioned by the loss of the ascending sap, which they draw out for their own support.

FOR THEIR DESTRUCTION.—Previous to applying the Mixture, a small or larger basin, or hollow, must be made just round the stem of the Bush, in proportion to the size of the tree; then pour into it a moderate quantity, or as much of the Mixture (No. 6) as may be supposed to find the whole of the roots on which they are feeding.

The larvæ of the Tenthrido Flava sometimes feed upon the foliage, chiefly in the middle of the Bush, but on account of the leaves being so large they afford more support, and are therefore seldom productive of any great injury.

BIRDS.—To protect the ripe Currant Berries that are intended to hang on the trees till late on in the season, from Birds, Wasps, and Flies, the trees may be inclosed in coarse canvas or garden mats. It will require much care to prevent the Wasp from making its entrance. The mat, or canvas, should be made secure, and if it is needful, bottles with sweet beer or water might be hung up on the outsides of the covering, to entrap them before they make their entry to the fruit.

RASPBERRY BUSH.

THE GRUB.—The larvæ of a small Moth infest this Plant in the spring. About the fore end of April, when full grown, they are similar in size and shape to those found inclosed in the tubercle or knots on turnips. The whole Maggot is quite red, forms a chrysalis about the fore end of May in the leaves of the Rasps, and produces the Moth at the latter end of May. It is very small, has brown wings, marked with a buff spot on the outer edge of each, where they are united to the thorax; other parts of the wings are spotted with very small irregular buff spots.

The parent deposits her eggs in the summer months, which most probably send forth the larvæ before or about the commencement of the autumn

months. They feed on the foliage till it is time for them to retire for the dreary months of winter. They commence their depredations at the spring on the base of the bud, and perforate their way quite into its heart, so, that by the time we should look for bloom, the whole union of leaves and bloom thus attacked has fallen a sacrifice; and at a more advanced state it eats out the principal body of the fruit stalk, leaving only the skin; the remainder becomes languid and soon dies. This is a serious mischief when the maggots are numerous, for whatever bud they get possession of it is sure to perish. The presence of the depredator will soon be detected from the drooping and withering of the young buds and shoots.

For their Destruction.—The only plan I can devise for their destruction at present is to split off, downward, the whole of the buds or young shoots thus infested. This will not be of any immediate advantage, or any service to the plant for the first year, as I believe each larvæ lets the bud it first possesses suffice for its support, without removing to another. It is therefore only beneficial by preventing the insect arriving to the emago or winged state, which, if permitted, it would establish its progeny for the ensuing spring. A boy would go over a great number of plants in a day, and gather the withered buds into a tin, or any vessel that would keep the maggot from escaping. It should be remembered to split the

bud or branch close off to the stem, that the maggot may be taken with it. Let them be burnt or destroyed.

The remedy thus laid down might appear worse than the disease, but if the infested buds were to be left on, they would not be of any service, but would entirely perish.

BEETLE.—In some parts of England this plant is much infested with a small brown Beetle. I remember, in the year 1808, in Nottinghamshire, a few miles from Retford, in a garden on the Forest, that the Rasps were entirely stripped of their foliage, which, I need not add, proved of serious injury to the plant and fruit.

FOR THEIR DESTRUCTION.—As these animals have never come under my notice since that time, at least with the same voracious character, I have not had it in my power to try any means for their destruction; but for the consideration of those who may be annoyed by them I would just give the following hints:—The evening before the means are to be used for their destruction, spread amongst the Rasps a moderate quantity of quick lime. Except about a foot in the centre of the rows, work it among the earth with a small one-hand fork, making it pretty fine and level at the same time. Then draw a shallow drill with the end of a hoe, and fill the drill with bruised beans, straws, or any thing similar, that would afford them concealment, and admit of the following operation being effectually performed: The next

day, when the Beetles are on the Rasps, strike them smartly with a stick, being careful not to bruise the buds or branches, and the Beetles will be thrown to the ground. The lime will be a means to prevent their harbouring any where but under the place previously formed for their reception. In a short time after they are forced to the ground, pour boiling water through the rose of a watering pan, all over the straw, sufficient to destroy the Beetle, or perhaps after sun-set, they will leave of themselves. The operation might be performed after sun-set, or after a shower of rain any time of the day.

APHIS.—This tree is also sometimes attacked by a very large species of the Aphides, considerably larger than any yet described. It is very active, and appears alarmed when any thing approaches to it. It reigns principally in July, when the fruit is ripe, a time that would be improper to apply any thing for its destruction.

FOR THEIR DESTRUCTION.—Should it appear before the fruit is ripe, the Mixture (No. 1) may be applied with the engine, or should it continue after the fruit is gathered, for the encouragement of the growth of the young shoots, on the ends of which they feed, they might have the Mixture as above applied. At the same time use the wisk.

STRAWBERRIES.

SLUG, *(Limax.)*—This fruit, when ripe, is often much annoyed by the Black and Grey Slugs in wet summers.

FOR THEIR DESTRUCTION.—Before the plant gets into bloom, they must be occasionally dusted over with quick lime late in the evening, after a warm shower, or before sun-rise in a dewy morning, twice in the course of a few minutes, at which time the Slugs are out feeding. The lime has then an opportunity of falling upon them, by which they are destroyed; or the lime-water may be used (as directed for Slugs in general) while they are harbouring among the plants. Lures of bean straw might be formed by laying 15 or 20 straws, or more, lengthways on the walks or allies; or cabbage-leaves and stalks, or any other refuse vegetables, may be laid to entice them to lodge under, when they are retiring from their nightly depredations. The lures might be moved in two or three days after, any time of the day when it is too dry for them to be out feeding, and then dust them over with quick lime.

The BLACK BEETLE also destroys much fruit when ripe, by perforating it, and leaving the remaining part useless.

FOR THEIR DESTRUCTION.—The bean straw might be laid as above, to decoy them to lodge under. In the day time, move the straw, and destroy them with the back of a spade, or by any

other way that is most convenient. Boiling water might be used advantageously by a person immediately following the one moving the materials, and pouring it upon them.

CAULIFLOWER.

SLUG *(Limax.)*—This much-esteemed vegetable is very liable to be infested by various kinds of insects. Amongst the number, the Slug may be said to stand in the list of its most formidable enemies. There are two kinds that appear most common, the Grey and the dingy Black. They are so well known that it will be useless to enter into a description of them, further than to show something of their habits. I would just observe, that the grey one is considerably larger and more plump than the dingy black or chocolate-coloured one. The latter often commit considerable mischief without being perceivable, on account of their being small, and so much resembling the earth. Both kinds, in warm situations, in mild weather, even in the winter months, will be found out of their harbour in search of food. At the beginning of March their appearance will be pretty general in a morning and evening, except the weather prove cold or very dry. Their retirements in winter are generally deep in the earth, under stones or heaps of rubbish, at the bottom of walls, betwixt them and the earth;

and in the spring, summer, and autumn months their habitations are similar through the day-time. When the weather is hot, and in cloudy, showery weather, a small protection suffices, under clods, or any fragments that may be lying on the ground, and among vegetables. Their offspring are produced from eggs which the parent lodges abundantly, early in the spring, and at several intervals through the summer months, amongst the clods of earth, and various places, where protection is afforded them from the sun. The eggs are round, about the size of mustard seeds, of a light transparent colour. Wet or dewy weather appears to be far more favourable to their increase and sustenance than dry weather; the latter retards and destroys them. The greatest portion of them will mostly survive very severe winters, even after being frozen. They prove very pernicious enemies to vegetation, especially in strong wet land, or in gardens well clothed with trees, &c.

Both kinds commence their depredations on this plant as soon as it makes its appearance above ground in the seed bed, by consuming the seed, leaf, and stem, close to the surface. It is not uncommon for many of the plants to be completely cut down by them at a more advanced state, after being some time permanently planted, and others lacerated in the stem and foliage, so that if they do not fall a sacrifice they are of little use. The depredators do not stop here, but at that advanced state when we expect to reap the produce,

how often are we grievously disappointed to find, instead of a handsome cauliflower, the whole is defaced and entirely unfit for the table, owing to the ravages of these formidable animals.

FOR THEIR DESTRUCTION.—The seed-bed may be slightly dusted over with quick lime early on dewy mornings, or after warm showers of rain in an evening, at which time they will be out of their cells feeding. Those upon which it falls will sluff a coat of slime, and such as properly cast it will chiefly survive, therefore it will be proper to repeat the operation in a few minutes, not to allow them to escape into their harbours before the second application, which will completely destroy all it falls upon, as they have not power to shed a second sluff, and the dust on the leaves will prevent the surviving ones feeding for a few days. It will be proper to examine the plants frequently, for fear some may be in their cells at the time of performance, and the eggs, which the lime has no effect to destroy, may also give forth a succession of depredators.

The following method will also be found equally useful: If it is likely that the Slugs will be numerous, lay a quantity of bean-straw, say from 20 to 30 or more straws, in thickness, firm and close, in the walks and alleys, immediately after the seed is sown, into which they will retire for protection through the day-time; or cabbage-stalks, or any similar refuse will answer the purpose. These must be well watered with lime

water (No. 13), any time through the day-time, or move the materials, and throw quick-lime plentfully amongst them, and upon the surface of the ground. The same steps may be taken with those in the nursery beds, either in the frames and under walls, &c.; at the back end of the year, or middle of winter, or also any other time when the plants are fixed permanently, let the whole surface of the plot on which they stand be frequently dusted over twice in a few minutes at proper seasons, when they will be out as above, that the whole may be destroyed before the flower comes to perfection, so that none may lodge in the flower. If the plants appear to be much annoyed, and there is not a good opportunity to meet with them out of their cells, which will often happen in dry winds, when they will be late in coming out in the evenings, and retire soon in the morning, in such cases, the lime-water as above, might be poured for a foot or more round the stem, where they will chiefly be lodging under the clods. Should the ground intended to be occupied by those plants have been much infested by the Slug, a good plan would be to dust the bare ground two or three different mornings, in time to meet with them out of their retreats. If they are neglected till the Cauliflower appears, the interior should be examined, and the Slugs gathered off.

The JUMPING BEETLE, or BLACK JACK, *(Hallica Nemorum.)*—This little animal is of a small size, very little larger than a mustard-seed,

ovated, black, with a dingy or dull white stripe on each of its upper testaceous wing cases. Its general habits in its perfect state are, to lodge in the earth in the night time or rainy weather, and follow its ravenous pursuits on fine days, in the act of which it appears quite alive to danger, as at the approach of any one it makes a prodigious leap. It proves a great enemy to the seedlings of this plant, as well as all the Brassica tribe, when they are in the seed or first leaf. In dry weather, it voraciously devours and very often consumes the whole of the plants in such a manner that if the gardener has not examined his seed-bed at their first coming up, he will be led to suppose that the seed has been bad, which attaches blame to the seedsmen, for delivering bad seed, when in fact those, together with the Slugs, Grub, and various other insects are the rogues, and not always the seedsmen.

For their Destruction.—Dusting the plants slightly and frequently over with quicklime in a morning is a good preventive, and although it does not destroy the insect, it will be found of great use in hindering their feeding. Frequent watering with clear water retards them a good deal. The Mixture (No, 6) kills them. This may be applied with the engine at the time of feeding; or it will be of service to have the beds made fine, and gently clapped at the time of sowing, and lures of bean straw, or similar materials, laid in the walks. These must be well watered over

with hot water, or the Mixture (No. 6) late in the evening, when and where these animals will be secreted.

Maggot.—The Larvæ or Maggot, which feeds upon the roots of this plant, is very similar in shape to those produced by the Flesh-Fly, which so frequently chooses that its offspring should join with us in a leg of mutton, or any other joint composing a portion of our larder store; but in point of size it is much inferior. It appears that the parent deposits her eggs the fore end of May on the plant, near the surface of the ground, or some perhaps are deposited on the ground, which are influenced by the sun to send forth the Maggot. This, after feeding a short time, descends by degrees, and derives its support from the stem part of the roots, or that part which the main roots proceed from, where it feeds for a few weeks, forms a chrysalis of a cylindrical shape, about an inch within the earth, in the vicinity of the plant, about the latter end of June, and produces the Fly in July, which so much resembles the House-Fly, (*Musca Domestica*), that I conclude that it is precisely the same. It appears that there are two broods at least in one year, as we find the same species infesting the Onion and Turnip in the months of August and September, and producing the Fly in March, after lying in a chrysalis state all the winter. These, I suppose, are the progenitors of those on Cauliflowers at the above period, but they seldom

injure the latter crops of Cauliflowers materially. Neither is the Cauliflower Brocoli or Cabbage much infested by the former brood. The Cauliflowers numerously infested as above often fall a complete sacrifice from their dissecting or consuming the rind and pulp of the roots, and leaving no vessels or arteries for the conveyance of the sap for the support of the plant. The plant soon exhibits a blue and drooping appearance, which clearly indicates that those little miners are or have been labouring at its foundation, which often ends with the destruction of whole crops, even when they are nearly at perfection. Whether the Fly is attracted by some disease in the plant or no I am not decided, but it is common for the plants to be annoyed in some part of the garden, while in other parts they are not at all injured by them.

Nothing has yet ever come under my notice that will destroy the Larvæ but what would destroy the plant. The only plan I can devise to prevent their ravages will be to anoint the bottom parts of the lower leaves with the Mixture, (No. 12), using a Painter's brush for the operation. This, together with frequent watering with the Mixture (No. 11) about the root, will, in a great measure, be a preventive to the parent Fly choosing it as a proper place for her progeny.

GRUB.—The larvæ of the moth, I believe of the genus *Noctua*, includes this plant among the unbounded varieties which appear not to be

rejected, as they present themselves in the way of this gormandizing animal. The insect is produced from an egg, in the months of July and August. Immediately after quitting the egg it commences feeding, and when full grown is about one inch and a half long, about the thickness of a moderate sized quill. It is of a brown or oak colour, and its skin quite hard. When disturbed, or thrown out of the earth, it coils round, in which position it will remain as though dead for a few moments, and then forces its way into the earth. It continues its depredations till the month of October, providing the weather proves favourable. About that time it becomes dormant, after descending a few inches into the earth, where it remains through the winter. About the middle or latter end of April it commences its transformation, and in a week or two assumes the pupa state, and issues forth the perfect insect at the fore end of June. It is of a moderate size, the top wings are dark brown, indiscriminately marked with a shade of lighter brown, but faintly; the under wings and body are of a light drab; the ends of all the wings are bordered with a fringe of a lighter shade. It is not so large as the Cabbage Moth, nor so long shaped, but the top wings are similar in colour. The body is dotted with eight very small faint black dots between each joint or segment. Like most of the Moth species, it is secreted amongst vegetation through the day time, and embraces darkness as the most proper mo-

ments for recreation and to procure support. The egg is deposited in June and July, amongst vegetables, weeds, &c., and is brought into existence in July and August. Droughty summers are most congenial to the whole process of this insect, and wet weather has the contrary effect. The latter prevents the union or copulation of the male and female; and should the weather prove favourable for the production of the larvæ, and afterwards be wet, it will check in a measure its depredations. I am not aware that any are destroyed thereby, but no doubt they are much retarded by wet and cold, which appear to cause them to retreat deeper into the ground, and become more sluggish, and not so voracious.

In the year 1818, at the latter end of summer, and most part of the autumn months, the season proved very dry, at which season these Grubs prevailed very alarmingly. They did not appear to be confined to any particular part, but I believe eigned in all parts of the kingdom; neither were they confined to any species or tribe of plants, in which circumstance they appeared to differ materially from the generality of the insect race; for a learned writer observes—"Almost every plant has its Louse," meaning, I suppose, that different insects makes choice of different plants; but I must confess, were it required of me to point out which of the vegetable tribe charms this general lover the most, or what it would not gormandize upon, I should be quite at a loss, for scarce any thing that

falls in its way appears to escape its ravages. In the above year 1818, 1826, and 1827, it proved a most formidable enemy both to the Horticultural and Agricultural vegetables. The autumn productions, of most descriptions, fell a sacrifice to it, especially in the year 1818, when Turnips, Rape, and other Horticultural produce, were swept completely away, so that I believe there scarcely was a good Turnip to be found, except in some very moist situations, and there but very few. These evils were produced by the Grub gnawing or shearing off the young plants a little within, or level with the surface, and sometimes totally consuming those in the seed leaf. When the stems of the plants are too old and hard for the insect to perforate, it will attack the base or lower parts of the leaf, and the heart of the plant, and such leaves as lay upon the surface of the ground, and when food proves scarce, it will travel to a considerable distance, till it can meet with it. Under such circumstances it will ascend plants of any kind, and fix upon them when it cannot feed near the surface. It is remarkable that some are often found dead in such situations, stretched at full length, a circumstance I am not able to account for, except they partake of food that does not properly digest or agree with them.

For their Destruction.—It will be impossible to lay down any plan upon a large scale for their destruction, but the following hints may be of some service on a smaller scale; I will

commence with the Cauliflower in the seed-bed. In a week or fortnight previous to sowing the seed, the ground, where it is intended to be sown, and for a moderate space round, should be well cleared of weeds, or other vegetation, which will cause the Grub to leave it in search of food. It would be well at the same time to plant a row of Cauliflower, Cole, Brocoli, or any similar thing that is most plentiful, pretty close to each other, all round the plot intended to be used, at a moderate distance, and in such a manner that the leaves will touch the ground, to decoy the Grub when in search of quarters for supplies. They might frequently be searched for round each plant, as below, and destroyed. As soon as the young plants appear above ground, they should be frequently looked over, and if any are cut off by the Grub, it will be readily perceived by the top, or sometimes a leaf lying withered on the surface. If a little attention be paid, the observer will soon be acquainted with these symptoms. A knife, or small pointed trowel, should be used in moving the earth about an inch deep, immediately in the vicinity of the stems thus cut off, say two or three inches round, where the Grubs will generally be found. They may be gathered into a vessel of any kind, with a little earth in the bottom, for the Grubs to secrete themselves, or otherwise they would be likely to creep out; or the plants may be watered round with the Mixture (No. 9), in a warm state, for about an inch deep, or sufficient for it to reach

the Grubs. This will cause them to dart out of their cells, with their head upwards, where they stand perpendicular, as though they were completely killed. They must be quickly looked for and gathered up, as they will recover in ten or fifteen minutes and retire again. After this process is over, destroy those gathered, by putting a little boiling water upon them, or in any other ready way.

Those plants pricked out of the nursery bed will require the same treatment as those in the seed bed. Where plants are to be permanently planted the ground should be hoed and raked, and a boy or two should follow the raker to gather up the Grub. A gill of the above Mixture may be applied to the roots of each plant if required, after being planted a few days, and a boy will be required to follow at a short distance behind the person applying the Mixture, that there may be time allowed for them to appear, and not be too long for them to return before gathered; or they may be searched for round the plant, as before mentioned.

Those operations, although tedious, are well worth the attention of those who are wishful to have this vegetable in spite of these depredators.

APHIS.—A species of the Aphis also annoys the Cauliflower. It presents a mealy appearance. This mealy matter transpires through the skin of its body, to that degree that the whole insect becomes covered over with it. It generally com-

mences its depredations at the latter end of May and beginning of June. It is equal in multiplicity to any of its tribe already delineated, and proves so great and notorious a pest to the Brassica tribe, that without giving any farther details I have no doubt the kind will be clearly understood. I would add, that after it once makes its attacks it continues its depredations till severe weather retards it, providing it is not before repulsed by the various enemies to which it is liable to fall a prey.

The plants in the seed bed are very commonly infested by them, and at so early a stage of their growth, that the depredations these animals commit prove serious. Their existence, although there may only be few, will be discovered by the curling of the leaves, and also by those parts of the leaves from whence they derive their support losing their green and exhibiting a light yellow. When the plant is at a more advanced state the edges of the leaf will most generally be found to roll up where they reside, the heart of the plant will also become crippled, and not extend freely. At a still more advanced stage these plants sometimes become so infested, even when we expect produce, that the whole is entirely useless. An occurrence like this happened generally in the year 1826; they reigned to that degree, I may venture to say, that in most situations scarcely a good Cauliflower was to be found throughout the whole season.

FOR THEIR DESTRUCTION.—If the plants are much annoyed before they can be pricked out, apply with the engine, (No. 2 or 7), and as soon as possible have them pricked into the nursery bed, or permanently planted, at which time it will be proper to immerse the tops in one of the above Mixtures. As they are liable to be again infested from other emigrants, let them be smartly brushed about with a soft painter's brush dipped in the seventh Mixture, and then finish with dashing the Mixture two or three times over each plant with the brush, or at a more advanced state of its growth the engine may be used.

CATERPILLARS.—Search for the various Caterpillars, and destroy them, as described on Cabbage.

BIRDS.—The seed of Cauliflowers is liable to be gathered up, after having been sown, by Birds, especially Spinks and Linnets, and also the young plants, when they first make their appearance above ground, often are quite destroyed, as at that period the Birds readily consume the whole. To prevent them, a good and effectual plan will be, as soon as the seed is sown, to cover it all over with garden mats or nets, and if the former, let them remain only till they are just rising the ground, as it would weaken the plants and make them tender to let them remain longer. As soon as the mats are taken off, dust the plants slightly over with lime two or three times in the course of

ten or fourteen days, when the plants will be out of danger. Should mats or nets not have been used, the time of the plants appearing must be attended to, and as soon as any can be found, apply the lime, as they will be attacked almost before they break the surface, especially if the insects have been previously attracted to the spot by the seed.

RABBITS.—In gardens where Rabbits obtain admittance, they will often do much damage, by shearing the plants off to the ground when they are first planted out permanently. To prevent them dust the plants over with lime.

CABBAGE, BROCOLI, COLE, SAVOY, &c.—Those different species of the Brassica tribe are subject to all those insects to which the Cauliflower is, except that they are seldom infested to any degree by the Maggot, which dissects the roots of Cauliflowers. I think the Red Cabbage, if any thing, is more numerously resorted to by the Aphis than any of the Brassica tribe. In June and July, 1826, they became so prevalent on both the Red and White Cabbage, and especially on the former, that the greatest portion became completely enveloped by them, and the Cabbage apparently of no use whatever. The Brocoli plants also could scarcely make any progress in growth owing to their prevalence.

FOR THEIR DESTRUCTION.—See Cauliflowers.

CYNIPS.—The Cabbage plants are often, in the autumn months, infested with the larvæ of a

four-winged Fly, of the Cynips genus. The parent, after making a puncture on the stem, just within the surface of the ground, deposits her eggs, which become inclosed in the healing wound, and after coming to animation, form a cell by feeding so as to afford little more than sufficient room to contain them. This is the cause of those tumours or knots so commonly seen on the stems. These knots are increased in size as the inmate requires support, and advances in growth.

FOR THEIR DESTRUCTION.—Those excrescences at the time of planting may be cut off, or forced off with the thumb-nail, sufficiently close to eradicate the Maggot. I do not remember ever seeing the Cauliflower thus infested; should it be the case, the same steps may be taken with safety and benefit to the plant.

CATERPILLARS.—The Brassica tribe is often molested by various species of Caterpillars. The first which I shall briefly describe is about an inch and a quarter long. The whole is of a similar green to the leaf it feeds upon. Its whole body is clothed with fine hairs or down. The joints in the body are scarcely visible, in short, so shapeless is the whole insect when stretched out at full length, a position it generally assumes upon the surface of the leaf, that we could scarcely suppose it to be a living animal, and it might easily be overlooked, without close attention. In the middle of October these Caterpillars will mostly have retired

under the coping and open joints of walls, or old buildings, &c. &c. They are transformed into a pupa state, and emerge in the spring the perfect insect, the lesser common White Butterfly, *(Papilio Napi.)* Their eggs are of a cylindrical shape, inserted in groups, several in number, on the under surface of the leaf, in July and August.

The next one to be mentioned is much larger than the one last described. It is about two inches long, thinly clothed with hair, its body principally yellow, maculated indiscriminately with black spots. The principal bulk will have retired by the middle of October into crevices of old walls, buildings, &c., where they are transformed to a pupa, which emerges in the spring months the common large Butterfly, *(Papilio Brassica)*, the body black, wings chiefly white, with the exception only of the upper wings being narrowly bordered with black, from the apex, or the part which unites with the body to nearly the tip-end of the wing, where it terminates with a boarder indiscriminately shaped, with two or three small black spots on the uppermost wing. The parent lays her eggs, which are oval, generally on the underside of the leaf of any of the Cabbage tribe in July, which in a week or two burst forth into animation.

It appears remarkable that when we examine those two species in their larvæ state, at a time

when nearly full grown, we find numbers of living young in them, which no doubt must be viviparously established on the plants for it is clear the emago only quits the ova.

The existence of those voracious animals is soon exhibited by the leaves being lacerated. Sometimes they will be found on the underside, and at other times on the upper surface of the leaf, and they generally prove more destructive to this tribe of plants than the former. Both those Caterpillars sometimes prevail to a considerable degree of injury to the Brassica tribe, which proved to be the case in 1825. It will be remembered that it was not uncommon to see whole crops of the Brassica tribe completely dissected, leaving only the stronger ribs of the leaf, with its stem, to remunerate the proprietor for his labour.

FOR THEIR DESTRUCTION.—I know no better plan for their eradication than gathering them by hand: a boy or woman would go over a great number of plants in one day. It should be observed to take them in time before much injury is done to the plant, and to examine in the performance the under as well as the upper surface of the leaf. The Mixture (No. 6 or 7) will completely destroy them done on with a wisk or engine, but as the other is so readily done that I should prefer its being adopted.

Another Caterpillar also attacks this genus of plants. It is thicker than the preceding ones mentioned; about two inches long, of a sooty

brown, one row of faint black oblong spots, directing themselves in an oblique direction on each side, has some resemblance to those which shear the plants of by the surface, but a larger and darker colour, and the skin not so tough or hard as the one it resembles. It commences its depredations in July, and continues to do so voraciously throughout the autumn months, and occasionally in winter, when the weather is mild. In March or April the Eruca retires into the earth, where, in a few days, it is changed to the Aurela, and in June produces the yellow under-wings Moth *(Noctua Pronuba.)* This Moth is about an inch and a quarter long, each upper wing is dark brown, dotted with a lighter shade, and one small faint circular spot a little nearer the wing end; there is also another irregular black spot rather larger, adjoining the former. The body and under wings of a deep orange, and the ends are bordered with black. Their retirements in the day-time in gardens, are generally among such things as grow thickly and pretty close to the ground, such as Strawberries, Turnips, Carrots, &c.

Their feeding appears always to take place in the night-time. The Cabbage and Cauliflower appear to be the favourite food for the Larvæ although it will attack most kinds of vegetables, flowers, &c. which have a little substance in the heart or flower bud, where it derives its support, by perforating its way into them, and often causes such parts totally to perish; and in some

cases it shears away the petels of the flower. When the Brassica tribe is infested by it, the heart will chiefly be perforated into holes, or much cut in pieces, and the depredators will be generally concealed thereabout. Such plants as afford no concealment, it will leave, and secrete itself throughout the day-time in the earth, about the stem of the plant.

FOR THEIR DESTRUCTION.—The only means for their eradication is to search for and gather them by hand.

SLUGS.—Those animals often in wet weather, at the back of the year, prove very pernicious to the Cabbage plants. At such seasons, previous to permanent planting, the ground should be well dusted over with lime two or three different mild mornings, as early as possible, while the dew is on, that the Slugs may not retire before the application. Should this plan not have been adopted before the plants are pricked out, symptoms of their depredations will be exhibited by the bottom leaves being eaten into holes; under those circumstances, they must be frequently dusted over with lime, at the periods when they are out of their cells, otherwise the lime-water may be applied for six inches round the plant, as directed for Cauliflowers. These operations should not be neglected at the spring of the year, that all may be destroyed before the Cabbages are required for use, as at that time they are too often found lodged in the Cabbage, when it is wanted for use: similar

steps should be taken for their destruction on all the Cabbage tribe.

GRUB.—The larvæ of the Moth (*Noctua*), that destructive animal, which shears the plant off as described on Cauliflowers should be searched for and destroyed in the manner there laid down, both in the nursery beds and after being permanently planted; but previous to the plants being moved from the seed-bed, the ground intended to be planted should be carefully moved with the hoe and rake, and a boy should follow after to gather up the Grubs.

BIRDS should be prevented from destroying the seed and young plants; likewise all the Brassica tribe, see Cauliflowers.

LOUDEN says "with respect to Caterpillars and Slugs, they commonly may be gathered by the hand, and the way to do it effectually is to begin as soon as they appear, employing women or children to look them over daily early in a morning. Poultry, and especially ducks and sea-gulls, are sometimes of use in keeping those and other insects under; and a hen and chickens will devour Caterpillars and Aphides greedily, but are apt to scratch the soil, if not timely removed. Turkey fowls are better."

The sowing of a little Raddish seed, with the seed of the Brassica tribe, is recommended to prevent the Beetle from devouring the young plants; it is farther stated by LOWDEN, that "when Cauliflowers are first planted out, they are fre-

quently infested with Flies, or their Larvæ, (I suppose the Jumping Beetle described on Cauliflowers) to attract which it is not uncommon to sow a little Raddish seed on the Cauliflower ground a fortnight before transplanting; the Flies preferring the tender leaves of the Raddish to those of the Cauliflower, the latter are supposed to escape."

I certainly prefer hand picking to encouraging poultry of any description, as the latter are so liable to do injury by picking the plants and scratching the ground. In respect to sowing of Raddish with the Brassica seed, I think it cannot be of much service, as the insect appears to me to be equally attached to the young plants of the Brassica and those of the Raddish. The sowing of the Raddish or Turnip seed a week or fortnight previous to permanent planting of Brocoli or Cauliflowers is likely to be of some service in Beans, when the Beetles are numerous, as the seedlings of all those kinds are preferred to older plants.

KIDNEY BEANS.

APHIS.—The Dwarf Kidney Bean is liable to be infested with some species of the Aphides, principally the Black kind, which so commonly preys upon the tops of the Garden Beans. It appears to attack the young pods, stalks, and leaves, which

cripples them, so that they are stopped in growth, and rendered useless.

FOR THEIR DESTRUCTION.—The Mixture (No. 2) may be used; applying it with the engine, or a small watering pan, it may be used in a careful manner, to waste the Mixture as little as possible. A person should follow closely with the wisk, carefully beating the plants, especially working the wisk from the ground upwards, in order to force the liquor on the under side of the leaf where the Aphides lodge.

RED SPIDER *(Acarus Telarius.)*—This plant appears to be the choice of the Spider, in preference to most other plants, and in dry summers it is frequently much annoyed by them. For a description see on Peaches and Nectarines.

FOR THEIR DESTRUCTION.—If they should become numerous, so as to require eradication, the Mixture (No. 3 or 5) must be done on with the engine or watering can, and the wisk used as above. Those plants grown in the forcing-houses are still more liable to be overrun by them than those grown out of doors, on account of being protected from cold and wet. The steps to be taken with those grown in pots will be to immerse for a moment the plants completely over head in the Mixture (No. 3 or 5), being previously prepared and lodged in a suitable vessel for the purpose.

SLUGS.—In wet or damp weather Slugs will

prove destructive to the young plants in the open air, as soon as the seedlings appear above ground, if they have not been destroyed previous to the seed being sown.

FOR THEIR DESTRUCTION.—The lime-dust will require throwing amongst the plants, and over the ground betwixt the rows, early in the morning, or late in the evening.

CARROTS.

GRUB.—The greatest pest to this plant is a small white larvæ of a small Fly *(Pollydismus Complanatus.)* I believe the egg is deposited on the top of the root of Carrots, near to the surface of the ground, in the months of May or June, and the latter brood in August or September. When the larvæ emerge from the ova they insinuate themselves into the Carrots always more or less within the surface of the ground. I remember finding the larvæ feeding nearly at the extremity of the lower end of the root, on the 10th of July, before the plants had attained an useful size. Some of the latter cletches form chrysalies in September, and others will even be found feeding so late as in the month of November. The perfect insects are produced in the spring. Moist weather appears to be the most productive of their ravages or depredations.—Those late dry summers the Carrots in general

have been free, or nearly so, of this pest. In 1827, the autumn months were generally wet, and Carrots, which before were free, became infested to a serious degree by those little miners.

It is not uncommon, in moist or wet summers, to see whole and extensive crops laid waste, and rendered useless, by their perforating and defacing the Carrot from one end to the other, which effect gives rise to the common term canker, which gardeners have so much to complain of in this vegetable.

RESPECTING THEIR DESTRUCTION.—I have not been able to discover any thing for their destruction, but it may be observed that the Carrots are most free from their attacks in land during the first, second, and sometimes a third year after it has been broken up from grass, and also in garden land, where a thin crop of winter onions is; or growing a thin crop of Carrots will often be found to succeed. The seed may be worked in either with a three-grained fork or hay-rake; or, if the Onions are too strong to use the rake or fork, a thin covering of earth may be thrown over the beds out of the alleys, which will suffice, if sown not later than March. In place of sowing in the beds, the alleys may be sown after a thin digging, only sufficient to make it convenient to work in the seed, and assist the plant when young. If the land is in good order for Onions, no tillage will be required. This practice will be found to answer in most cases where land is light,

for it appears, when the land is too loose, that the Carrot throws out a profusion of fibrous roots, to obtain a firm support, while, otherwise, we scarcely see any fibres, which renders the Carrot much finer. How to account for the Carrot being more free from this animal under the above treatment, I am at loss to know, except the grass land may not be resorted to by those insects, and a considerable time may elapse before progenitors emigrate to such parts. Onions also may repel the parent.

SMITH, in the Caledonian Horticultural Memoirs, says, that his practice is to sow his Carrots "always in one particular spot of ground," which he says, "I have annually manured well with pigeon dung, laying almost as much of it, though of a hot nature, as if it had been rotten horse-dung." This, he observes, has never failed to produce an extraordinary crop, and he goes on to affirm, that "a worm could not be found in my Carrots during the four years I have continued this practice;" and remarks, that when he had used the horse-dung, "they were so much cankered that they were almost unfit for use." Mr. Smith is led to think from his experiments "that the pigeon-dung is a good preventive of the Worm in Carrots."

HENDERSON, as we find in the Caledonian Memoirs, has proved, by experience, that Carrots sown in March are liable to be destroyed by the above insect, while those sown the 1st of May, keep quite free, and observes, "I am in-

duced to believe that it is owing to the early sowing that Carrots are destroyed by the Worm in light early soils."

MACRAY, in the above Memoirs, states, that he sows Carrots on ground where Artichokes has stood a few years; and in order to accomplish that object, plants annually a succession of Artichokes, on which plants he says "those vermin annot subsist, they soon perish, and the ground where the rows stood has all the advantage of a new soil."

SMITH has scarcely made his communications sufficiently clear in respect to the manner in which the manure should be applied. If he digs it into the ground, it can neither prevent the parent from laying her eggs, nor destroy or prevent the larvæ from feeding, as they always perforate and bury themselves in the Carrot, and therefore the manure cannot have sufficient power to destroy or banish them while protected in their cells, as we find them very tenacious of life, even when unprotected and immersed in a solution possessed of much more powerful destroying properties. It is more probable that the manure is of service, if laid on the surface, and only worked among the earth with a fork or garden harrow; as by laying it upon the surface, it may prevent the parent choosing such situations to establish her progeny.

HENDERSON'S plan of sowing late does not strike me as being at all useful, but I should rather say the contrary; for, by the Carrot being

sown soon, I should suppose it would attain to a much greater size than when sown late, and therefore I need not add, afford a better opportunity of escaping so great an injury. I am persuaded that young and old are alike liable to be attacked. The parent, as mentioned in the preceding pages, deposits her eggs at different periods, and at such periods as when both the latter and former crop are growing. This induces me to conclude that it is erroneous to suppose that those crops which are sown late will escape those depredators.

MACKRAY's plan appears to be of some service, if the artichokes do not afford them proper food, and of course, those plots of ground will not be resorted to by the parent insects. But the ground required for artichokes is often of so small a compass, that it is more than probable that it will soon be discovered; at least I should think, after one crop of Carrots, that it would be as bad bad as ever. I would just remark, that the reason the ground will be clear of the insect is not that the insects perish because they cannot subsist on the artichokes, for when the plants are first planted out at the spring, it is about or before the time when the emago emerges from the pupa state; therefore as she has her choice in placing her offspring, we may venture to say, that most generally nature has so ordered, that the instinct of the parent will lead her to establish her progeny where suitable food can be procured.

PLANT LOUSE, *(Aphis.)*—A species of the Aphides, similar to those which attack the Peach and Nectarines, probably the same kind, frequently attacks this plant, and when it is attacked at an early stage of its growth, it commonly falls a sacrifice. When these depredators reign numerously, the whole plant will be in their possession, but their more particular choice appears to be the heart or younger leaves. The plants, when robbed of their juices, assume a debility, which they show by turning yellow.

FOR THEIR DESTRUCTION.—The insects may be completely eradicated by applying the Mixture (No. 2) carefully once or twice, with the engines, and at the same time brushing the tops about with the wisk. This will be well worth the attention of gentlemen gardeners; and indeed market gardeners would find it worth while, rather than have their crops destroyed, or so injured as to be of no use. Trouble and wasting of the Mixture may be greatly prevented, by having the Carrots sown in rows, that the person may be better able to go amongst them, and beat on each side of the rows.

SLUG.—In showery damp weather, while the Carrots are small, they are in danger of being consumed by the Slugs.

FOR THEIR DESTRUCTION.—They should be attended to at such seasons, and be frequently dusted over with quick-lime, at those periods when the Slugs are out feeding, being careful that

the dusting is repeated a second time, immediately after the first, as the Slugs sometimes shed a slimy vesture with the lime, as communicated under the head of Cauliflower, where the history of this animal is more fully delineated.

BEANS.

APHIS.—A species of the Aphides, commonly called the Colliar, attacks Beans. It appears a near relation to those to which the Cherry tree is liable. Its appearance on the Beans is seldom before the fore end of June. It takes its station principally on the extremity or top of the plant, till its family becomes so numerous, that the tender parts will not afford room and support. The younger pods then are resorted to by those animals. By extracting the juices from the young pods, and ejecting a glutinous secretion, they prove injurious to the crop.

FOR THEIR DESTRUCTION.—On the appearance of these insects, at the commencement of their reign, or at least before they begin to spread over the plant, the tops may be pinched off with the thumb and finger carefully, and put into baskets, and afterwards burned or scalded. Some attention should also be paid to the state in which the plants are. If they are shedding their bloom, the sooner the operation takes place

the better, but if not arrived at that state, they may remain till there is a danger of the insects descending lower, where the operation cannot be accomplished. Topping of garden Beans is generally recommended as being advantageous to the growth of the corn, and will therefore be of two-fold service. The Mixture (No. 2) may be applied with the engine and wisk to great advantage, if any should have obtained possession of the pods.

MICE will carry away the Beans when sown, therefore means must be used to destroy them. See on Peas.

PEAS.

MICE.—These animals prove very destructive to the seed after it has been sown in the drills, by burrowing for it, and conveying it to hoard in a more convenient situation, to be ready when required for food, and sometimes by eating it on the spot. In this manner they frequently contrive to deprive the sower of the whole of his early sowings. The latter sowings more frequently escape destruction on account of their vegetating more quickly, and becoming sooner out of danger.

FOR THEIR DESTRUCTION.—When decaying whins can be readily procured, it would be well to spread a sufficient quantity, just to cover the Peas in the drill, at the time of sowing the early crops. In order to do it effectually the spines that have

fallen off the plants, should be used, or the most prickly branches made small, that they may lie close together, which no doubt will be difficult to encounter, and prove a strong protection against those nightly depredators. Traps also should be set. The most simple and useful kind I know of is composed of two small sticks, about 9 to 10 inches long, and a slate of a moderate thickness, 10 inches long and 6 broad. After making a firm smooth place with the back side of a spade betwixt the row of peas, the sticks are to be thrust into the earth seven inches one from another, leaving only about three inches above ground. Previous to this being done each stick should have a slit made about half an inch deep in the centre, at the top end of them. In those slits a piece of thread, just sufficient to bear the slates, must be fastened to each stick, after being thread through the centre of a garden Bean, with the skin peeled of, leaving the thread rather slackish. Then rear the slate on the ground, so that about the middle of the slate may rest upon the thread in a sloping direction, with the Bean in the centre of it. The Mouse then gnaws he thread in two to procure the Bean, which lets the slate fall upon it. Care must be taken that the ground be level, that the slate may not fall hollow, and thereby suffer the Mouse to escape.

Several of these traps should be set in different directions, among the Peas, and at the time of sowing them, that the whole of the Mice

may be caught before they discover the Peas, for it is most probable that if they once get a notion of the Peas, they may not take the bait. When their nests are to be met with, two or three gallons of water may be poured in at one of the holes, which will cause the Mouse to bolt out. It must be observed that there are two holes or entrances into each nest, which must be watched by persons armed with any thing to destroy the Mice.

BEETLE.—The Pea is, in dry summers, subject to a small brown Beetle, which commences its depredations about the latter end of March. In the year 1825 and 26, they prevailed in some situations to such a degree on the young plants, that they were completely deprived of their foliage, and rendered unproductive. They feed principally in the day-time, and retire under the clods of earth, &c. in the night, and at the time of rain. When nearly approached, they appear alarmed, and suddenly fall to the ground.

FOR THEIR DESTRUCTION.—Nothing appears to be of service for the destruction of these insects that can be applied when feeding, without injuring the plants; indeed their sudden disappearance renders it extremely difficult to apply any thing so that it will light upon them. The only thing I can devise is to make the earth as fine and close as possible about the Peas, and betwixt the rows at the time of sowing, so as to make it as difficult as possible for the Beetle to find har-

bour, then draw a shallow drill, with the end of a hoe; then lay in a small quantity of Bean straw, bruised, or old coarse tanners' bark, or any thing similar, that would lie pretty close; at the same time it must be sufficiently hollow to form cells for their concealment. In addition, small lumps of earth may be thinly scattered amongst the fragments used, and as a greater inducement a few bean or pea leaves may be scattered over the materials already mentioned. It perhaps would be a farther improvement to dust the ground about the stems of the Peas occasionally with quick lime, in order to make the retreat among them less desirable, and necessitate them to flee to the lures. As late as possible in the evening, when it is thought necessary to destroy those assembled in the retreats, a sufficient quantity of scalding water may be poured over them. This practice appears tedious, but when all other means fail, no doubt the gardener, who is proud to supply his master's table with every luxury that can be produced, will resort to this practice rather than this valuable vegetable should be wanting.

SLUGS.—The early crops of Peas in moist strong land commonly fall a prey to these destructive depredators.

FOR THEIR DESTRUCTION.—The ground where the Peas are sown should be made pretty fine, so as to afford as slight protection as possible. When requisite, the whole ground occupied by Peas should be dusted twice over in the course

of a few minutes with quick lime, early in a morning, or late in the evening, in mild damp weather, when they will be out of harbour.

SPARROWS.—The Sparrows frequently prove very destructive to the Peas at their first appearance above ground, by consuming the rising buds.

FOR THEIR PREVENTION.—To prevent their attacks, the rows may be slightly and frequently dusted with quick lime when the dew is upon them, that the dust may better adhere to the plant; or the rows may be thinly covered with small birch twigs, or any other fine twigged branches, which must be taken off before the plants become weak or blanched. These will serve as bottom supporters when the Peas want supporting or rodding.

ONION.

MAGGOT.—The Maggot of the House-Fly, as described on the Cauliflowers, in some situations proves an enemy to this bulb. It is most probable that the parent is attracted by some disease in the Onion, as we often find that in those Onions which are goutted and moulded, (terms known amongst gardeners) the bulb is most liable to its ravages.

FOR THEIR PREVENTION.—The best preventive I know of will be frequently to water

the beds slightly over with the Mixture (No. 11). The Onions should also be sown on such soils as will produce health to the plants, that there may be no inducement for the Fly to place her progeny among them.

Mr. John Mackmurry, speaking of the Maggot, says, "this animal may, in my opinion, be considered as a nondescript, and peculiar to the Onion and Shallot;" and after detailing the different diseases the Onion is subject to, he proceeds to remark, "I have always remarked, that whenever the Onion becomes diseased it is liable to the attraction of the Maggot;" he observes, "I do not think that the Maggot ever passes from one Onion to another, and any remedy sufficiently powerful to destroy the insect must inevitably destroy the Onion itself; in these circumstances the Horticulturist perhaps does all that is in his power, if he be duly careful to select for his crops of Onions those soils and situations that are most likely to resist the various common incidents of season peculiar to this very variable climate, and containing such eligible food, and in such proportion as this bulbous esculent requires."

Mackray says, "Salt applied as a manure is a good preventive of the Maggot, but it rarely happens that a sufficient quantity can be procured for that purpose," and also he recommends as a good practice to sow Onions in ground that has had Strawberries four or five years,

and may be repeated for two or three years successively.

JAMES MACDONALD recommends the transplanting of Onions at the spring, from a bed sown at the end of February, and previous to planting, dips the whole root of the plants in a mixture of three parts of earth and one part of soot, with a sufficient quantity of water to make a puddle. The Onions are planted in rows, about six inches from each other, and in the rows from three to four inches. He says, "in the transplanted Onions there was not the least appearance of either Worm or Rot."

The Onion, while in its seedly state is liable to be injured by the Slugs. For their eradication the lime dust should be used at proper times, when the Slugs are out feeding.

GRUB.—The larvæ of the Moth *Noctua* as mentioned on the Cauliflower, in droughty summers, shears away the young Onions, called winter Onions, sown at the latter end of summer for spring production. The plan most advantageous to be adopted will be to keep the ground clear of vegetables and weeds for some time previous to sowing the Onions. Cheap or readily procured vegetables may be planted in rows here and there on the plot required, to entice the hungered larva to feed in a more contracted compass, that the knife and soap-water may be more readily rendered useful, as directed for the Cauliflower.

SHALLOTS, a species of the Allium, are frequently annoyed with the same disease which the Onion is. In addition to what has been said about the Onion, I may quote HENDERSON'S communication, in the Caledonian Horticultural Memoirs—"I pick out the very smallest of my Shallots for planting. I plant about the middle of October, the ground being previously manured with old well rotted dung, or house ashes. The autumn planting is the whole secret. By this management, I have never seen the Shallot hurt by the Maggot in the smallest degree;" he says, "the smallness of the roots planted prevents them from growing mouldy."

CELERY.

SLUGS.—In wet seasons, or moist situations, these animals disfigure this vegetable very materially, by scolloping and lacerating the blanched stalks, so that it is scarcely fit for the table. They, together with the Earth-Worm and larva of the Fly *Pollydismus Complinatus*, which prove so injurious to the Carrot, are the real cause of the complaint commonly called the Canker.

The Slugs should be expelled, if possible, from the plot intended for Celery with lime previous to its being planted, at any rate before the Celery requires earthing for blanching, which will be

best accomplished by frequently dusting it over, when the Slugs are out in search of food; and at each time, when the earthing up of the Celery is performed, and after, if required, the rows may be watered with the Mixture (No. 13) as the lime dust at such times cannot be so readily thrown upon the Slugs. As the Celery, with the earth put to it, forms a complete retreat for them, where they can lodge and feed in nearly all kinds of weather, they should be frequently attended to, for, although the ground may have been cleared of the parent, it is very probable that there will be eggs remaining, which will be brought into animation, and follow the ravenous pursuits of their predecessors.

WORMS.—These reptiles very much spot the blanched Celery, by piercing it into small holes, which must depreciate its value.

FOR THEIR DESTRUCTION.—At the time of earthing up, the operator, or a boy to follow him, should be provided with quick lime, which must be thrown moderately upon the Worms, as they appear. In the performance the quantity required to destroy them will be readily perceived by the performer; it is very trifling, providing it alight fairly upon them. They may also be readily destroyed by pouring the lime-water (No. 15) in the chasm where the Celery stands.

Salt is also destructive to the Worms, and may be thinly scattered upon them, providing it

is kept from the plants, as in that case it would prove injurious to them.

GRUB, *(Pollydismus Complinatus.)*—See on Carrots. I can mention nothing for their destruction. They are so deeply fortified in the plants where they are situated, that nothing we can apply will reach them without destroying the plant. The parent may be partly prevented depositing her progeny by frequently applying the Mixture (No. 11) carefully on the plants. It would also be well to choose land that has been cropped with winter Onions, early Peas, Potatoes, old Strawberry plots, fresh broken up land, &c., and always avoiding plots that have had Carrots the year before.

GRUB. (See on Cauliflowers.)—The Larvæ of the Moth, *Noctua*, must be searched for with the knife, and destroyed before the plants are earthed for blanching; or the Mixture (No. 9) poured to the roots to send out the Grub, which must be immediately gathered by hand and destroyed.

The larvæ of the Fly, (I believe a species of *Musca*,) commences its attacks on the leaves in seasons congenial to its existence, about the middle of August. It is about the size and shape of those Maggots which feed on the Cauliflower roots, and the Turnip. It feeds on the pulp or fleshy part of the leaf, commencing near the edge, leaving the two outer rinds or skins for its protection or harbour, where it remains till the fore

end of October, about which time it descends into the earth, and forms the pupa. This is twice the size of a Mustard seed, of nearly the same colour, but different in shape, which is ovated, divided into numerous segments, or annular joints, and remains in this state, till the month of May, when the animal emerges in its perfect state, considerably less than the House-Fly. It is very similar in shape, yellowish body, wings transparent, marked indiscrimately with irregular sized spots of a chocolate colour, similar to the parent of the *Tenthrida Flava.*

It appears to me that there must be two broods in one year, as the time is so long between the parent emerging in May, and the time I discovered the larvæ in August; and as it is more likely than otherwise that copulation takes place soon after those insects arrive at the emago or perfect state, those that are met with feeding in August are a second generation. Though the Celery may not have been the prey of the first brood, yet there may be other plants equally suitable to their palate, and the Celery must fall in the way of the second; but as they have never come under my notice, either before or since the years 1823 or 24, (a memorandum of the exact year having been omitted) I have not had an opportunity to come to a clear decision on that point. The effects of their depredations will be exhibited by the infested parts turning brown, and withering. Some crops in the above year, in the

month of September, scarcely contained a single perfect leaf, but the whole assumed the appearance as though they had been scalded with hot water. I could not help being astonished at the several preposterous conjectures this spectacle raised, respecting the cause. By some it was attributed to strong wind, which blew from the west at that time, others supposed the sun had scorched them while in a wet state, from a shower in the heat of the day. It needs no proving that these arguments must have sprung from careless observers of nature; if either wind or sun had the above effect this complaint would, as a matter of course, appear general amongst us.

For their Destruction.—The only means I have discovered for their destruction will be to gather off all the infested leaves, or crush the larvæ with the hand without destroying the leaf, when they first appear. The remedy might appear as bad as the disease, but if attended to in time good will be done; at any rate, it will prevent their being so numerous another year. No application can be of service for their destruction while feeding, but what would injure the plant, as the larvæ is inclosed between the two outer rinds of the leaf.

RADDISH.

BIRDS.—This plant while in the leaf, as well as the seed, affords great attraction to some kinds of Birds, especially the Linnet and Spink: they gather the seed when sown which lay uncovered, and no sooner does the young plant make the least appearance above ground than they are destroyed, in the act of which the top is devoured, and the other portion cast on the surface of the ground.

FOR THEIR PREVENTION.—The bed may be dusted slightly over with lime, at the moment the plants are breaking the surface, and frequently after, for about ten days, or till the plants are out of danger; or the beds at the time of sowing may be covered with garden mats, bean stalks, nets, or the like, minding when the two former coverings are used that they must be taken off when the principal portion of plants are sprung above ground, as they would be much weakened where they to remain too long over the plants, and as they would not generally be discovered by the birds at the time of uncovering, in consequence of which they would generally escape without much injury.

Slugs should also be destroyed with lime at proper seasons, when they are out feeding, and previous to sowing the seed, &c.

TURNIPS.

BEETLE.—The Jumping Beetle, commonly called Turnip Flea, or Fly, frequently, in moder-

ately dry seasons, proves a most desperate enemy to this plant while in the seed-leaf; crop after crop is commonly swept away, while in this state of growth; and not only has the Horticulturist to complain of this enemy, but the farmers, in all parts of the kingdom, have to dread its laying waste whole and extensive crops.

FOR THEIR PREVENTION.—Their depredations may be greatly retarded by frequently dusting the seedlings over with quick lime, commencing as soon as they break the surface, and a still more effectual preventive would be to sow the seed in rows, double the quantity intended to stand, say five or six inches asunder, and not to spare the seed, as a greater number of plants will afford more food, and necessarily give a better opportunity for some to escape: every other row must be well dusted with lime, leaving the row not intended to stand free of the dust, that the Beetle may be allured to feed there in preference to those intended for the crop.

It is a practice sometimes with farmers to roll the land over where the young Turnips are growing with a roller, in the evening or night time: for what reason this is done I am not able to judge, except it is supposed that while they are in their nightly retreat under clods in the earth, &c., the rolling will crush them, or sadden the earth so as that they will not be able to ascend to make their appearance on the surface again. I should be afraid this plan would not be worth following,

for but few, in comparison, would be killed, and I am persuaded were they to be buried ten times as deep in the earth as what the roller can do they would make their escape.

APHIS.—This plant is much subject to a species of the Aphides, which, when the season proves unfavourable to its growing freely, and favourable to the insect's existence, proves a serious pest to the crops. This complaint, I believe, generally prevailed in the year 1827. They are always found on the underside of the leaf, and the effect produced will show itself by the leaves turning yellow, drooping, and separating from their bulb by being deprived of their juices. This may be mistaken for a similar complaint, which is termed Canker, though the stems of the young leaves in the latter case are more crippled and rusty in appearance: this is probably produced by a sudden change in the weather, such as much rain after a long drought, &c.; but the difference will be easily ascertained, by searching for the insect.

FOR THEIR DESTRUCTION.—In the case of small crops it will be well worth while to use means for their destruction. The Mixture (No. 7) may be applied with the engine, and at the same time wisk the tops about with the wisk. If the Turnips are in rows, the performance will be much better effected, and would not be disadvantageous to the crops.

SLUGS.—In strong wet land the young plants are liable to be destroyed by Slugs. Quick lime

must be dusted over when it is necessary, while they are out feeding.

GRUB.—The Grub of the Moth *Noctua*, described on the Cauliflower, in droughty summers proves a most ravenous animal to the latter crops of young Turnips, by shearing them off close to the surface, and by preying upon the heart of that portion which may escape being cut off by them. In this way the Horticulturist, and especially the Farmer, has greatly to dread its reign. It is well known that in some of the late dry summers this animal prevailed alarmingly on this plant, I may say nearly throughout the kingdom.

FOR THEIR DESTRUCTION.—I can direct no plan for the destruction of these animals more than searching for them on a small scale, and letting the ground be made quite free of any kind of food for them, a short time before it is to be sown. Some rows of vegetables should also be planted here and there to attract them, where they must be searched for and destroyed. I would just observe, that the only remedy favourable to extensive crops will be, instead of shooting and frightening the Crows, to use every encouragement to induce them to resort there, that they may gather the Grub for sustenance.

Birds will gather the seed and eat the heads of the young plants, to the destruction of the crop,

FOR THEIR PREVENTION.—The plants should be dusted over with quick lime, while the dew is

on, that the lime may stick upon them. This should be done as soon as any appear above ground, to prevent the Birds feeding, and a second time in two or three days after.

CYNIPS.—The Turnip is subject to the attacks of the larvæ of Cynips, which seldom prove to be of any serious injury to it, more than giving the Turnip an unsightly appearance, by causing it to project lumps, in repairing the damages done by the Maggot. We are indebted to the Larks, and other Birds, for keeping them under by billing out the Maggots from these excrescences, and devouring them.

LETTUCE.

APHIS.—A largish species of the Aphis sometimes proves a most formidable enemy to the Lettuce. I have seen large plots of fine cabbaged Coss-Lettuce rendered entirely useless from the prevalence of these insects. If they become prevalent while the plants are young, they will be crippled and retarded in their growth, so that they will not attain a useful size. We find them appear first about the middle of April.

FOR THEIR DESTRUCTION.—From their first appearance till near the time the Lettuce is wanted for use, it may be proper to apply the Mixture (No. 1) for their destruction; or, in place of the former, No. 7 may be used. In the

operation each must be brushed on warm among the leaves, with a soft wisk; or if the Lettuce is planted pretty close together, it may be put on with the engine, and assisted by using the wisk. When it is supposed the insects are dead, a good washing, with clear water, from the engine, will be of essential service to clear the plants, providing rain does not fall at the time.

APHIS.—This plant is very liable to the attacks of the Aphis, as described infesting the roots of Currant Trees.

FOR THEIR DESTRUCTION.—The Mixture (No. 6) may be poured at the roots when they appear to be attacked. To know when that is the case, they must be examined at the roots when debility appears in the plant, which will be principally shown by their drooping.

GENERAL INFORMATION FOR THE DESTRUCTION OF INSECTS.

It would be too tedious, and extend the pages of this work much farther than was originally contemplated, to enter into a description of the whole of the plants sustaining injury from the insect race, and at the same time would not add much to the utility of the work; therefore, I shall content myself with laying down a few

general rules, which I trust will, with the information given in the preceding pages, enable the intelligent and diligent Horticulturist to free himself from those kinds of insects infesting Horticultural productions, not particularly specified above.

APHIDES.—The different species of this genus are so extremely numerous that there are few trees, shrubs, flowers, or vegetables, which at one time or another are not infested by them. It may appear almost superfluous to give any directions for the preservation of forest trees from the various enemies they are subject to, but I would just remark, that where a young ornamental tree becomes infested, so as to make it an eye sore, a little pains and expense would not be ill bestowed in restoring it to its original beauty, especially in grounds of small extent, when the trees only exist in limited numbers, and where the whole are necessary, for the decoration of the scene. It may also be of advantage for some of the tree seedlings, and young trees of a more advanced stage of growth, in nursery grounds, to be relieved from the insects by which they are infested. Favourite shrubs and arbacious flowers will still more claim our attention, to the protection of health and beauty, and this can be more readily accomplished, on account of their dwarfy growth. I shall content myself with adding, that the following rules will be found

useful, when it is deemed necessary to resort to them.

There are but few of the Aphides tribe that are both oviparous and viviparous, and still fewer that are altogether oviparous. Those which we find so prevalent on the Larch, are, as far as I have been able to trace their different processes never viviparous.

I make those remarks because any application for their destruction, while they are in the ova state, would avail nothing; this is necessary to be understood, that the Horticulturist may save himself the trouble and expense of using the Recipes at an improper period.

Those of the Aphides that are both viviparous and oviparous in one year, will be found to establish the ova at the back end of the year, and the succeeding generations are produced viviparously. A circumstance of this kind will be found pretty clearly described in the account of one species infesting the Apple tree which may suffice without any further details.

FOR THE DESTRUCTION OF APHIDES.—In most cases it will be proper to commence the destruction of the Aphides at their first appearance on the plant, providing the plants will admit of it, that is, if there is no danger of disfiguring the plant, injuring the blossom, or destroying the young setting fruit.

With respect to those which are on the Larch, and others which may breed in a similar

way, it will be perceived that it will require care and repeated applications to destroy them, as the ova and the insects are often possessing the branches at one and the same time.

Those kinds producing a cotton-like secretion, such as we see on the stems and branches of the Apple tree, on the Beech and Larch leaves, &c. with a view to economy, it will require to be unclothed pretty well with clear water or soap suds, forced on with the engine, that less of the Mixture may be necessary to destroy the insect.

For those plants and trees of the most delicate or tender kind, the Mixture (No. 1) must be applied; and in other cases, such as on ornamental trees and shrubs, (No. 7) may be resorted to, using the engine and wisk at all times when they can be applied; and in all cases it will be better to repeat the applications the next day, or not later than two days after, that the destruction of the half-killed insects and others that have been missed, may be rendered complete. The most proper time for the application will be in a morning or evening, when the sun is not powerful, as the leaves of some kind of trees would be liable to be scorched, if made wet in the heat of the day. At the time of rain it must also be avoided, as wet weather would tend to weaken the Mixtures. Those insects infesting the roots of various plants, must be destroyed with the Mixture (No. 6.) See Currant bush.

CATERPILLARS.—Some kinds of Caterpillars

prove very destructive to the foliage of various plants, shrubs, and trees, especially the webbed Caterpillar of the Moth *Phalœna Padilla*, described on Apples. Forest trees and Quickthorn hedges are sometimes so annoyed with them as to be completely divested of their foliage.

FOR THEIR DESTRUCTION.—Similar steps may be taken as severally directed for the various Caterpillars mentioned in the account of the Apple tree.

The *Slimy Larvæ*, or *Slug-Worm*, on the Pear tree; the webbed Caterpillar of the *Phalœna* genus upon Plums; the Larvæ of the Moth *Noctua* upon Peach and Nectarine trees; the Caterpillar of the *Tenthredo Flava*, and of the *Phalœna Grossularita* upon the Gooseberry bush; the Caterpillar of the Moth *Noctua;* and the Grub of the *Musca* upon the Cauliflower.

P. MUSGRAVE's gardener at Mayfield, near Edinburgh, in his communications to Caledonian Horticultural Society, describes a method of destroying the Moth, which he says, is preferable to any other plan, while in the larvæ state. It is as follows:—"The net used is made of strong black gauze, that colour being best for the purpose; it is a yard and a half in circumference, a foot deep, and attached to a whalebone rim; the handle is made of common wood, about a yard and a half long. With regard to the manner in which it should be used, all I have to say is,

that I keep the net in my right hand, and the moment an insect was driven from its place, I swung the net in the direction opposite to that in which it flies; if I missed it the first attempt the second generally succeeded."

A person is employed to shake one branch of the standard trees at a time, not to drive too many from their retreat at once, and another is ready with the net to destry them; and for wall trees, he dislodges them with a willow branch, by wisking the trees. He calculates that, by killing "200 insects, there will be no less than 10,000 eggs destroyed or prevented;" which, he says, a person may do in a few hours.

This plan I am not able either to approve or disapprove, as I have never entered into the merits of it, but it is evident, when the parent is destroyed before establishing her progeny, the increase is prevented. The operation, however, it must be confessed, is very tedious, and the operator must be made acquainted with the proper periods to perform it, or otherwise, if the emago has its liberty too long, after arriving at perfection, the egg will be voided, and then destroying the Moth will be of no use, as in that state no injury is committed. If this plan is worth attention, I think it would be equally applicable to various Butterflies and large Moths.

The SPIDER, or *Acarus*.—The various species that have come under my notice, consist of four,

which are briefly mentioned in the preceding chapters. This tribe of insects is generally known to be a great pest to a variety of trees, shrubs and flowers.

The DESTRUCTION of the various species may be performed as severally directed for the *Acarus* upon the Apple tree; the *Acarus Telarius*, and another species, upon Peach and Nectarines; and the species on the Gooseberry.

COCCUS or SCALE.—The various species of this genus do not confine themselves to one species or tribe of plants, but will be found to feed on most kinds of trees and shrubs. Where they happen to exist, the same means may be used as described for the *Coccus* on the Pear; *Coccus* on the Apricot; *Coccus* on the Vine; and *Coccus* on the Berry bush. Similar attention will be necessary for the destruction of other species not mentioned in this work.

The larvæ of the small FLY, which causes brown spots on the leaves of different kinds of plants, can only be destroyed by the method laid down for its destruction on the Pear tree.

THE THRIP.—Only one kind appears to have presented itself. It is so troublesome, that I am persuaded few practical gardeners are unacquainted with it. For description of it, and means for its destruction, see Peach and Nectarine tree.

For directions as to the Larvæ of the HOUSE FLY feeding on Cauliflowers, Turnips, Onions, &c. see Cauliflowers.

THE SLUG, *(Limax.)*—There are several species, infesting gardens; the white or alba, and a still smaller one nearly black, (I believe *Hyalinus)* present themselves most commonly. Their general habits are much alike. See for the two species under the head Cauliflowers. The name Slug I think is very properly applied to them, for besides slumbering for months in their cells, they do not appear to put themselves out of the way by making extensive journies to procure food, but seem to prey upon the first vegetable object that happens to fall in their way. In weather congenial to their habits, they prove most formidable enemies to almost all kinds of vegetable productions. These animals, with the Snails, are hermaphrodites, that is both sexes are included in each individual, and they establish their progeny from a globular egg deposited in the earth.

FOR THEIR DESTRUCTION.—Quick lime will be found effectual, and may be applied in all cases where it can be applied so as to alight upon them while out of their retirement, and in situations where it will not be considered unsightly. To accomplish that end as much as possible, they must be attended to late in the evening, or before sun-rise in a morning, in damp mild weather; and as they will sometimes evade the first dusting, a second dusting will be necessary in the course of a few minutes, which will completely destroy them. In cases where they feed without quitting their retreat, such as in tussacks or clusters of

arbacious plants, &c. they may be watered over with lime-water; (see No. 13), or decoy them by laying a few Cabbage leaves, or any other refuse that may not appear disagreeable, to which they will adhere, then gather them, and let them be destroyed, with lime or lime water, or in any other way.

The Florist's Manual, as we find it quoted in the Encyclopædia of Gardening, gives a very simple and efficient method of destroying them; "When there is reason to suspect their hidden attacks, the only method to entrap is to place a common garden pot over the infested roots, and it will rarely occur that the enemy is not discovered, as Snails fasten themselves to the side or tops of boards, mats, or cabbage leaves so placed, and then are easily taken. In droughty seasons it will be of use to water the plant before it is covered, as the moisture of the earth will be an additional motive of attraction, to draw the animal from his hiding place."

THE SNAIL, *(Helix.)*—This genus is, I believe, always furnished with a shell from the moment it quits the ova, which affords it a habitation. The shell is artfully enlarged, as the inhabitant increases in bulk, and when the animal sets out on a journey, it never fails to carry it on its back. Those animals will often be found in great numbers in shady aspects, at the bottom of old walls, in thickets, in places where rubbish is collected, &c. They will sometimes ascend the

wall trees to a considerable height, and destroy the fruit, leaves, and young shoots, and will annoy most other plants falling in their way.

Wet, damp, mild weather is most agreeable to them, and they may be met with early in a morning or late on a evening, also in cloudy, showery weather, in the day-time. The most ready way of destroying them will be to gather them by the hand. They may also be attracted in the way directed for the Slug. Lime will completely destroy all species when thrown upon them. The lime-water is not quite so effectual. Salt will destroy both the Slug and Snails, but seldom without a second application, except thickly laid on. The lime, however, kills them more readily, and can be used without injury to the plants, and at less expense.

It must not be supposed that any application to the ground or plants promiscuously, will have any effect in destroying them, when they are in their harbours, as they will be sure to abstain from feeding or coming out upon either the salt or lime, till the effect is lost.

The *Chermis* genus is found to prey upon the foliage of a great variety of trees, shrubs, and flowers, The kinds presenting themselves to my notice are small, scarcely so large as a middle-sized Aphis, but very different in shape. They approach in miniature, near to the form of some of the smaller Moths, furnished with four transparent wings, about twice the length of the body

One of the species is of a cream white, whilst the other is something darker, spreckled promiscuously and thickly with dark red spots.

A species similar to the latter will be frequently found upon the Sage plant, but it is not so much spotted, and its spots are larger, and more of a chocolate colour. These three kinds have four legs, nearly of the whole length of both body and wings, which assist them to make extraordinary leaps, when at any time disturbed. The larvæ of each kind, in miniature, very much resemble the Brock, or Froghopper, which produces saliva or spittle so commonly seen on the various minor growing plants. They are very active in making their escape from danger. In this state they appear early in the spring, produced no doubt from the parents which are found in existence in September on various plants, the white especially on the Rose, the red spotted on the Plum tree, and the other on the Sage. The whole feed on the underside of the leaf. Those on the Sage continue feeding till about the latter end of May, when they commence their transformation, and arrive at the perfect state about the latter end of June or beginning of July. There are several broods or generations in one year. Both the larvæ and perfect insects produce a similar brown-speckled or fleaked effect on the leaf to that caused by the Spider, by perpetually nibbling the under rind or pulp of the leaf.

FOR THEIR DESTRUCTION.—Either the 1st or 8th Preparations may be resorted to, at proper times, according to the state in which the plant is on which it may be feeding. Care must be taken not to use it when there is any danger of disfiguring the blossom of plants, or injuring fruit in its most delicate state.

BEETLES.—These are an extensive genus; many species of them prove very destructive to garden productions, especially in dry seasons. So shy are they in general, and so dingy or earthly-like brown are many of them in colour, and others so very minute, that the Horticulturist will often be deprived of many of his seedling crops, without detecting his enemy. Peas and Beans, Acacia, and other plants have suffered during the late summer very materially, by one kind (*Melolontha Horticola.*) The Apple blossom has also been deprived of the fructuous part, by, I believe, the same species, and many other trees and vegetables fall a prey to other species of this genus.

The only plan I can devise to prevent their doing mischief on trees, liable to their attack, will be to besmear a portion of the trunk round with a thin coat of common tar; probably gas tar might answer the purpose. It should be applied at the fore end of March, about the time when they leave their winter residence to enjoy the vernal months. This is intended to prevent their ascending the trees, for although they are furnished with wings, it appears that

they prefer climbing to flying, for they are seldom to be seen on the wing, and therefore I dare say, rather than fly to obtain possession of the tree, they will travel on foot elsewhere to obtain provision. If the trees should be in their possession before the tar is applied, after it is done the tree must be well shaken, to force them to the ground. For Wall trees allurements of Bean straws, or a narrow board or boards may be laid close to the wall, flat, or nearly so. Should they be on the tree, wisk them off with a fine soft wisk, so as not to bruise the leaves. When they are in their harbours, after this operation, either late in the evening or early in a morning, pour scalding water upon them. Similar steps may be taken for those infesting vegetables, or other plants as directed on Rasps and Peas.

Seedlings, such as Thyme, Sweet Marjoram, and various other plants, which appear to waste while in their seed leaf, should be carefully attended to, to discover the depredators, as it will often prove that the damage is done by some of this genus, and probably by some that are so minute as to be scarcely visible to the naked eye. Lures as on Peas may be formed in the alleys and the beds should be watered with the Mixture (No. 7), on a dry day, which will destroy the small kinds it falls upon, and banish those not destroyed to harbour in the lures, where they must be destroyed with scalding water.

Wm. Swainson, Esq. F.R.S., F.L.S., informs us, through the medium of the Gardener's Magazine, for Jan. 1828, page 295, of one kind (the *Anamalia Horticula*) being very destructive in 1826 in his garden. He says, "the perfect insect appears in the greatest abundance during the end of May and the whole of June, swarming upon the Rose bushes, and in a few hours destroying, or disfiguring, every flower that had opened since the preceding day. They appear to confine their ravages almost entirely to the Rose. Numbers were picked from the bushes every day, and the gardener received much assistance in his occupation from Sparrows, and other semi-insectivorous Birds. No insects are more easily captured than these, and if a few active boys were to be employed, at the proper season, in picking them of the bushes, the thousands, nay millions, of the larvæ, which would otherwise appear during the next three years, would be effectually prevented." To prevent the insects from depositing their eggs in the earth, he goes on to remark, "I should recommend that as soon as the perfect insect appeared, a top dressing, as I believe it is called, of either lime or cinders should be laid on every part of the surface of the infested ground. This dressing should be finely sifted, and be compact, that the female could not readily insinuate herself from the surface, for the purpose of depositing her eggs beneath. It should also be nearly a span deep, by which means those few

which might partially succeed in burrowing below the surface, might either be deterred from continuing to labour or depositing their eggs above the true soil; this dressing should be left until no more of the Beetles are seen, it then might be removed, and all apprehension for the succeeding year dispelled."

I would just remark, that the former method of gathering by hand strikes me to be much preferable to the latter mode recommended, which appears to be a most laborious and disagreeable method, and cannot be adopted extensively with propriety. We are left, no doubt unintentionally, in the dark respecting what steps are to be taken to destroy the eggs and insects, when the materials are gathered from the ground; they, I suppose, are intended to be removed with the lime or cinders, after the parental office is accomplished. If they are to be left to hatch in those materials, I should be afraid the larvæ would contrive some way or other to procure support that would bring them to perfection.

THE EARTH-WORM, (*Lumbricus.*)—There are numerous species of this genus. Their general habits are familiar to most people. It is well known that dewy, rainy, and dull weather is most suitable to their different processes. We shall find them to be most prevalent in strong wet soils, owing to their retaining moisture longer than those of a gravelly, sandy, or stoney nature. In hot weather, as well as in intense frost, they retire

deep into the earth, for both the sun's rays and the slightest frost, acting upon them, shortly destroy them.

The larger Worm, *Lumbricus Terrestris* commonly called the Dew-Worm, and no doubt so called on account of its lodging on the surface of the ground in mild dewy weather, proves the most destructive of its genus, especially to small or seedling plants, or small young plants of any kind, by drawing them up by the roots, which they lodge in, and about their cells: they are also productive of much injury to garden walks, lawns, &c., by casting up the earth. When they happen to get admittance into garden pots they do incredible damage by dislodging and wasting such earth as the plant roots do not occupy, which must naturally deprive the plant of necessary support. The damage is done more in this way than by feeding on the roots; for, I believe, they do but little in that way.

For the Destruction of Worms.—When they are numerous, at the time of digging, the digger should be provided with quick lime, or perhaps it would be better to have a boy in attendance: as the digger, or diggers, proceed in the trenching or digging the boy should spread a thin dusting of lime in every trench, in such a manner as it would best fall upon the Worms; or in place of the lime, a small portion of salt applied, so as to alight upon them, would prove effectual. It may not be improper here to remark, that it

must not be supposed that laying the salt or lime upon the surface of the ground will answer the end, without its falling upon the Worms. Some of the supporters of the salt system would make it appear that where salt is used it will not only serve for tillage, but prove of essential service for the destruction of various kinds of insects; certainly, as I said before, it will destroy Worms, and also Slugs, Snails, and Slug-Worms, but it must alight fairly upon them. I feel persuaded, however, that I state the very extent of its merit, on that head, for no other vermin, that I know of, that is injurious to vegetation, will be destroyed, though it should fall fairly upon them; therefore any random, or indiscriminate salting of land, without there is something more important in view than destroying of vermin, would be a waste of both salt and time.

When Worms are neglected, at the time of digging, their mischief may be greatly decreased by dusting the surface of the infested ground as often as it may be deemed necessary, with No. 14; each dusting may be applied as thin as possible, but when the weather is wet it will require doing the oftener, as the efficacy is destroyed by wet, or the earth may have a good watering through a coarse watering-pan rose with the Mixture, (No. 15) which will effectually destroy them, at seasons when they are not too deep in the earth, viz. in the evenings and mornings of the spring and autumn months, and in wet summers. By

this operation many will be destroyed in their cells, and others will quit their abode, and appear on the surface in a few moments, which will also perish, for although they may wander about a short time, it will seldom be found that they enter either their own cell or any others, and though they may not have received so much of the solution as to destroy them, they will not survive many hours of sunny weather. A still more effectual method to induce them to appear on the surface, will be to dissolve twenty or twenty-four grains of Hyd. Oxy. Mur. in one gallon of water, which, if made small, and stirred well about, will be ready for use in a few minutes, and may be poured moderately on the infested parts: this will not destroy the Worms, but cause them to quit their retreats in a most astonishing manner, when they may easily be destroyed with the lime or lime-water. In cases where the lime would appear offensive, such as on walks and flower-beds, it may be left in the bottom of the vessel that it is prepared in, and the clear water used, but where the whole, or nearly so, can be used together, it will be more effectual.

The Worms annoying plants that are in pots may be destroyed by watering the pot occasionally with the Mixture (No. 15); but to prevent the Worms entering the pot at first, it will be proper that there should be a foundation made of coarse coal ashes, then add such a quantity of saw-dust,

or sand, as will cover them up to the rim; or it will be proper to have apartments, flagged in such a manner that the superfluous wet will run off at the time of raining or watering, and use the saw-dust, sand, or tanner's bark, free from Worms, for plunging the pots in.

LOWDON, in his Encyclopædia of Gardening, page 487, says, "The Earth-Worm is most effectually kept under by watering with lime water. Salt, vinegar, allum, or other acrid waters, will have the same effect, but are injurious to vegetation, and besides less economical. The lime water, as Forsyth directs, is to be prepared by pouring water on quick lime, and letting it stand till it settles clear. The grounds infested with Worms should have their coats scraped off, then the water should be applied from the rose of a watering pot. In the evening, and early in the morning, or on approaching rain, are the best seasons."

A gentleman, residing in London, did me the favour to send me a similar Recipe to the above, but more fully particularized, for which, he informed me, if I mistake not, before the great secret was divulged, the second-hand inventor, (I think I shall not be far wrong in using the term, as it appears the utility of lime water was first discovered by Forsyth) had the courage to ask, and I may add the good fortune to obtain, the sum of half-a-guinea, from a considerable number of subscribers. What extent of information they had in return I have no knowledge, but I suppose

the following Recipe, which my friend sent me, will be the principal part:—

"RECIPE FOR DESTROYING WORMS AND SLUGS.—To one hundred gallons of water put a gallon and a half, or about a spade full and a half of slacked lime, stir it well about, and let it stand about five minutes to settle, then, with two large watering pots, with coarse roses, water your lawn, walks, pots, &c. For destroying Slugs put double the quantity of slacked lime. The liquid will not injure either flowers or vegetables: the proper time for distroying Worms is in damp mild weather, in autumn or spring, till the beginning of May; and for destroying Slugs on a mild evening, after a shower of rain, or early in a damp morning, when they are on the surface."

I scarcely dare say the above Mixture is ineffectual either for the destruction of the Worms or Slugs, after having been sold at so great a price, fearing lest I should have misapplied it somehow or other, or lest the lime in Yorkshire should be destitute of the same efficacy as that used by the prescriber, however I find it too weak of the lime in both cases.

The FLEA LOCUST, or FROG-HOPPER, *(Cicada.)*—This insect, in its immature state, evacuates the froth so generally seen on various kinds of plants commonly known by the name of Frog, or sometimes Cuckoo-spit, which envelops the animal while feeding on the young shoots, and which

often much disfigures and injures our favourite flowers, and proves of serious consequence to ripe Strawberries.

FOR ITS DESTRUCTION.—The best method I can devise will be to employ boys, or women to crush them with the hand on the plant. They will be readily discovered by the frothy evacuation they produce on the plants.

EARWIGS, or TWINGES, *(Forficula.)*—These animals are so universally known that I need not enter into any description of them, for I believe they are looked on with terror by children, I dare say in all parts of the kingdom, under the idea that they take up their abode in the ear when opportunity permits, and produce deafness. They will often be found very destructive to the hearts of many kinds of flowers, leaves of trees, and ripening fruit.

FOR THEIR DESTRUCTION.—Lures of bean straws, made into small short bundles, hung up and laid down as it is necessary, about places where they are found will be of use. The straw must be looked over two or three times a week, and plunged into boiling water. Pieces of woollen cloth, old stockings, or similar warm materials, may be used for lures with equal benefit. The Mixture (No. 7), without tobacco, completely kills them, when applied so as to fall upon them. Many of those secreted in the hearts of plants, may be destroyed by grasping the infested part between the thumb and fingers, and pressing

it sufficiently to destroy the depredators, and at the same time not to injure the plant.

WASPS and FLIES, when troublesome to various kinds of fruit, must be destroyed by decoying them into bottles with sweetened beer. See on Peach and Nectarines.

ANT, (*Formica.*)—This animal sometimes proves very troublesome, and although some species are destructive to other insects, yet I think it is not sufficient to compensate for the damage they do by disordering kept grounds, and destroying small and delicate plants, by burying some with the casts or hills they throw up, and disturbing others in pursuing their labours.

FOR THEIR DESTRUCTION.—Boiling water should be poured into their nests. The operation will be greatly assisted by making holes in their nests with a sharp stick, so as to receive the water to the bottom of it.

RATS and MICE may be caught in the usual way, by traps. See Mice on Peas.

BIRDS.—There are various kinds of Birds that may be mentioned as being injurious to the Horticulturists; some of which, namely, the Linnet, the Spink, the Lark, and the Dove, are fond of gathering the seed and seedlings of several tribes of vegetables; others, including the Thrush, the Blackbird, the Sparrow, the Crow, the Jay, and the Jackdaw, deprive us of some of our fruits, while the Sparrow and the Black and Blue-Cap destroy buds of various

kinds of trees. These, together with numerous other kinds of birds, often require a watchful eye, to prevent their depredations.

The protection of the seed and seedling plants from the feathered race, will be best accomplished by covering them with nets, fine-twigged branches of trees, bean straw, &c. and also dusting them frequently over with quick-lime.

For the preservation of fruit the best way will be to cover them with old casts of fishing nets, when it can be readily done, and in other cases to set up scares of some kind, such as the figure of a man, stuffed hawks, cats, &c. also rattles, (see on the Cherry tree), and alarm them by frequently discharging a gun or pistol.

The destruction of buds of trees may be partly prevented by dusting the trees thickly over with quick-lime, after rain, when the trees are quite wet, which will greatly aid it in adhering to the buds. It will be proper to look over those trees liable to be attacked in January, as they sometimes commence their depredations by that time, and continue them till the leaves begin to expand, in the course of which time a second or third dusting will be necessary, or scares may be set up. See on Gooseberries.

It may appear to some that a more complete and ready plan than any of the preceding, would be to destroy the Birds. But how great would be the evil when we consider the great utility of insectiferous birds; for it is quite clear that were

it not for them, together with those insects which are no doubt designedly created for the subjugation of vegetable enemies, it would be in vain even to contemplate the existence of many kinds of vegetable productions. The Aphides, the Caterpillars, the Grubs, and numerous other vegetable destroyers, would prevail so as to deprive us of a vast portion of our vegetable productions.

I may mention a few of those Birds, by way of showing how unjustly some of them are deprived of friendship and protection. The poor Sparrow unfortunately stands among the worst criminals on the list. I must confess it is difficult to plead his cause so as to bring him in guiltless, for he carries on his roguery so glaringly that there are but few who are not acquainted with his depredations, in robbing the corn field, depriving various trees and plants of their buds and fruit; but if we could as readily see and pursue his good properties as clearly as his faults, I do not hesitate to say, they would much more than counterbalance any evil he commits.

The Sparrow is of essential service in destroying the Aphides on the Apple, the Berry bush, and other trees, but more especially in destroying the various kinds of Caterpillars infesting fruit and other trees. When the Sparrows are seen hunting over those trees, in the spring and summer months, it will be found that they are in search of either the Aphides or Caterpillars, but more especially the latter. The Caterpillars,

so destructive to the foliage of the Berry bush are mostly kept under in gardens were Sparrows discover them; they also destroy Moths, Butterflies, Beetles, and many other insects.

Mr. BRADLEY, an intelligent writer, has calculated that a single pair of Sparrows, having young to maintain, will destroy 3360 Caterpillars in a week! and, I have not the least doubt of that number of Caterpillars of the Tenthredo kind, would, in the same time, strip from thirty to forty moderate-sized Berry bushes of their leaves, providing the weather proved congenial to their habits. Surely this alone is no small thing in favour of those almost friendless animals. While writing on this subject, I am reminded of a remarkable circumstance respecting a Sparrow and cricket. Although it will be leaving the proper course of this work, yet it may not be uninteresting to some; therefore, under that impression, I venture to communicate it from minutes made at the time.

It has been a custom with my family to feed the Birds near the kitchen door; the Sparrows became from habit so familiar and emboldened as frequently to march into the kitchen, as though they constituted a portion of the family, and did not hesitate to regale themselves with any thing they happened to meet with in their way. One of those foragers, apparently the parent of a craving progeny, one day was noticed by one of our family that was in the kitchen at the time, to

approach near the fire-side, without the least dismay, where a large Cricket happened to be out of his cell, which the Sparrow seized instantly, with such eagerness to all appearance, as though its booty was of the rarest kind, and would afford a sumptuous dish. It happened, however, that this poacher had nearly been disappointed of his game, for not having killed it on the spot, in carrying it off to the place of execution, the poor little creature naturally became alarmed at its situation, made an effort, rescued itself, but in spite of the prodigious leaps which the terrified animal made, so resolute and eager was its antagonist that, after a few struggles, he succeeded in carrying it off, and placing it in the possession of its young. By them it must have been joyfully received, for almost in a moment the rogue returned, strutted boldly along to the same place, but hearing the report of a gun at that moment, (no doubt aimed for the destruction of some of its companions) its courage failed it so as to cause it to retreat. Its fears, however, being soon banished, in a few moments it returned a third time, hopping along apparently with the greatest confidence of success, but a lady, intending to watch its proceedings, having seated herself too near it, deterred it, and it made its exit without accomplishing its design.

The Bluecap, the Flycatcher, the Spink, the Redbreast, the Warbler, the Wren, the Swallow, the Thrush, and the Blackbird, also may be

classed, as well as many other birds, amongst the insect destroyers, and I think should not be revengefully destroyed because they gather a few seed buds, and share with us in partaking of some of our fruit. The Lark should also be esteemed as a very useful bird, especially to the Agriculturist. I remember in the month of February, 1825, when laying out a gentleman's grounds, in the neighbourhood of Pontefract, noticing vast numbers of Larks resort to the turnip-field, and on closely examining the turnips, I found they had been much infested with larvæ of the Cynips, but the greatest portion appeared to have been discovered and destroyed by these our favourite songsters, by billing open those tumours or knots produced in repairing the damages done by the inmate. The Crow, like the Lark, does not so immediately come under our consideration in this work, as it does not often resort to gardens, excepting occasionally some may venture their lives in some of the large sale gardens : there is, however, something so peculiar and useful in their habits, that I cannot well pass over them without adverting to a few of their peculiarities. Although these useful animals are maliciously eyed by the Farmers in general, I must say, respectfully, that it is with them a great oversight. Let them only observe their course when the Labourer is turning over his fallow ground, and fitting it for what it is destined, and they will see him surrounded with multitudes of Crows, gathering up Worms, Grubs,

Beetles and other insects, which I need not say, had they been left undestroyed, would have been most injurious : this, in some degree, the Farmer appears to perceive, and lets his visiters regale themselves without interruption, but here ends his kindness towards them, and no sooner does he commence cropping his grounds, than he declares vengeance against them, forgetting the favours he has received from them, and apparently unconscious of their usefulness hereafter. Would the Farmer take the trouble to notice them in their general habits I am persuaded he would be more cautious in destroying them so indiscriminately, as he would find that nine times out of ten, excepting in seed-time and harvest, they would be rendering him essential service in gathering the various kinds of vermin so destructive to his produce. It perhaps will be remembered that in the year, I believe 1818, the crops of turnips generally throughout the kingdom were completely swept of by the larvæ or Grub of the Moth, *(Noctua)* so that it was rare for a good turnip to be found, or even one of any kind. In a journey which I had to York, in the latter end of autumn, in the above year, my attention was much attracted by incalculable numbers of Crows assembled in various fields that had been cropped with Turnips, but to the disappointment of the occupiers those Grubs had spared them the trouble of reaping. I was, however, readily convinced the Crows was in pursuit of those depredators for the obtaining of

which they appeared to labour much and dig with their bill to a considerable depth in the grounds, On my return home, my supposition was confirmed, as I found several Crows labouring in a similar way with their bills on a piece of Turnip land, that had been much infested with the Grub, and on closely examining it I found holes made by them to a considerable depth, out of which, no doubt, they had exterminated or extracted the Grub. They do not confine their valuable services to the grass, fallow, and turnip field, but will be found equally valuable in their resort to the Corn field in the early stage of its progress, also on grass land, and, in short, I may say, the whole of the Farmer's productions are at one time or other rescued from the ravages of various enemies by them, and yet they are generally looked upon as the most formidable depredators the Agriculturist has to contend with.

I must not have it understood that I suppose all are ignorant of their utility, for I have met with some examples to the contrary. A Gentleman Farmer waited upon me in the year 1826, to know what steps were to be taken to eradicate the Grub of the moth *Noctua* from his Teazles, which they appeared to be consuming fast away. I recommended the employment of Boys and Women to search for them with knives round each infested plant, and to be sure not to banish the Crows from feeding in the infested field. He said he had already found the Crows of essential ser-

vice in assisting to preserve these plants. He employed a good number of hands to gather the Grubs; and under these circumstances he obtained a moderate crop of Teazles, while in most other parts the crop was very indifferent, and in many completely destroyed. But I can almost fancy I hear it asked, "But if the Crows are to be encouraged, and not at all interrupted in their increase, what is to be the consequence in seed-time and harvest?" In reply I would recommend such inquirers to use the same means which have long been practised, namely, employing boys to watch in the fields. Let them shout a few times more, and suffer them to use a few more chargings of powder, giving them strict charge to leave out the fatal shot, the expense of which being relinquished will probably defray the expense of the extra powder. The Farmer will find the tending of his Corn field of two-fold service, for while he is preserving his Corn he is forcing the Crows to procure support in those parts which are annoyed with Grubs, Worms, Beetles, &c., which, in all probability, might otherwise have done irremediable damage.

FORCING OR GLASS-HOUSES.

APHIDES.—There are some species of the Aphides that are found to annoy various kinds of plants, protected by glass, especially some of

those grown in Green-Houses or Conservatories. These, instead of giving the principal attraction to our pleasure grounds, are sometimes rendered disagreeable and even disgusting from the sickly and dirty appearance the plants exhibit, in consequence of the insects feeding upon them, and of the excrementitious fluid they eject.

FOR THEIR DESTRUCTION.—The well known practice of fumigating with tobacco or tobacco paper, is found to be an effectual means of destroying them, when it is properly attended to, and may be performed with safety in Forcing houses, excepting at that critical period when the fruits are exhibiting their blossom. Under such circumstances, it would be better to defer the operation till the splendour of the blossom has passed. The way in which the operation is to be performed, will be to choose a still evening, and just before the smoking is commenced, a gentle steam should be raised in the house, by watering the flues with water, or any other method the gardener deems proper, as this will be a great means of preventing the escape of the smoke out of the crevices of the glass, and will also blend with it, and greatly aid it in adhering to and destroying the insect. The moment the steaming is accomplished, the bellows tube must be charged with tobacco, leaving room for a few hot cinders, which must be laid upon the tobacco. The tube being again fixed in its socket, the performer, if able to bear the smoke, plays the

bellows in the house, that the smoke may alight upon the floor, being always careful to avoid playing it directly upon any of the plants, as they would be injured by it.

The house must be so completely filled, that the whole of the plants may be hid from the operator. If this were not done, it is more than probable that some might escape death, and by their vast increase would again soon numerously populate the plant. It would be better to fill the house again the succeeding evening. If English-grown tobacco is used, instead of damping it with water, it would be of great advantage to use strong tobacco water, as the English tobacco is not so strong as that manufactured.

A very proper period for the destruction of those insects which annoy the Green-house plants, will be in autumn, at the time when they are removed from the summer Green-houses, or other apartments for their winter destination; or, if necessary, any time through the winter months will do, taking care to have them clear of the vermin before the early part of spring. If only a few plants are infested, rather than fumigate the house, it would be better to remove them into a small room, where the smoke could be well confined, and fill it as above; or each plant, together with the pot, might be immersed, in a vessel supplied with the Mixture (No. 1.) There should be much care in removing the plants, that the insect may not be shaken off and left in the house. It may

not be improper to remark here, that fumigation is not efficacious for the destruction of any other kind of insects. I need therefore scarcely say it will be better to abolish that practice, so long misapplied by many, except for the destruction of the Aphis.

The ACARUS, or RED SPIDER.—For description see on Peach and Nectarines.

Many different kinds of plants in Glass-houses are infested by the Red Spider, which often prevails to a serious degree.

FOR THEIR DESTRUCTION.—Any time from the month of October to the beginning of February, the early Forcing-houses infested the preceding summer should be well washed, in all parts where the Spider is at all likely to be secreted, and the later Forcing-houses at a later period, but not to be too late for them to have quitted their retreats before the application. The Mixture (No. 3 ℈) may be done on quite warm with the engine, or brushed on with a painter's brush, with the addition of one pint of turpentine. See on Vines in Forcing-houses. The bark-pits, floors, flues, &c. may be well watered over with boiling water, for their destruction. When in the act of feeding in the spring and summer months, those plants infested must be dipped over head in the Mixture, leaving out the turpentine; and in all cases where the plants are large or inconvenient to remove, they may be brushed with the Mixture, with a soft painter's brush, on the under side of

the leaves, where the insects reside. Frequent watering with clear water though universally recommended, does not destroy them, neither is the application of the sulphur and snuff of any use, as directed by Speechley and others. See quotation on Vines.

THRIP.—For description see on Peaches and Nectarines. A similar treatment will be required to eradicate the Thrip, as laid down for the Spiders.

COCCI.—There are several species of this genus, which appear to infect the Glass-houses, some of which are the following:—The *Coccus Vitis*, described on the Vine; the Mealy Bug *(C. Adonidum)*, described on the Gooseberry; Brown Turtle Bug *(C. Hesperidum)*, generally found on Pines, Oranges, Myrtles, and various other plants, and which, when fully grown, is an irregular ovated brown scaly inert insect; the White Mealy Bug, (I believe, *C. Hesperidum var)*, much smaller than the last, of a circular form, white and testacious, and possesses those plants which are subject to the Brown Turtle. All these species, while young, are furnished with several legs, and two antennæ or horns, all of which, when first excluded from the egg, are so minute as to require a magnifying glass to discern them. For a few days, till permanently fixed, they will be found to wander over the plants pretty actively, and most species, when fairly fixed, commence manufacturing a vesture,

which at the commencement appears downy, and mixed with a gummy matter. This becomes hard, as it increases in bulk, till at its full size, when it is quite shelly. In this state the female parent lays a considerable number of small white eggs, and then dies. The male about the same time commences his transformation, and quits his hammock in his winged state, about the time the eggs are brought into animation.

The COCCUS VITIS, described on Vines, differs materially from most other kinds. When about to establish its progeny, it produces a cotton-like substance, which nearly separates the Scale from its abode. In this nest it envelops its innumerable eggs, and then dies.

The MEALY BUG *(C. Adonidum)*, described on Gooseberries, differs from most other kinds, in not becoming testacious, and in not being cemented or fixed to the place it first possesses. From the time of its first coming into existence to the time it retires to quit its eggs it is able to travel about. The female retires into crevices of the tree or plant she infests, or into the earth, bark-pits, or other concealments, to perform the parental office, where she manufactures a white downy substance, in which she completely secretes herself, quits her eggs, and like the rest, dies.

FOR THEIR DESTRUCTION.—One great point to be observed to accomplish their destruction will be to use the means while the Cocci

are young, and not to postpone the application till their cases or hammocks become so hard as to resist the application; and it will be still worse if it is omitted till the progenitors have established their eggs, as in that state any application for their destruction will be found useless that would not destroy the plant on which they exist. The Mixture (No. 3) may be applied quite warm to the infested parts, with a spunge on large leaved, or on moveable plants, and smaller plants may be dipped in a vessel containing the above Mixture. To do it properly the pot should be covered over with moss, tow, wool, or some such material, that when the plant is immersed, the earth may be prevented from falling out of the pot. The Mixture may be put on with the syringe or the engine, as the operator may see necessary.

If this application is attended to at proper periods, I have no doubt that whoever has occasion to use it, will find it a satisfactory remedy for cleansing his plant of this tribe of depredators. The appearance of that great and long-dreaded enemy, the Pine Bug, which I suppose to be the Mealy Bug *(C. Adonidum)*, need not dismay the Horticulturist, as he will be able to repulse his enemy, by having recourse to this Mixture, and applying it carefully to every joint of the plant, where it is likely to be lurking, as soon as the whole have left the ova, and taken possession of the plants. Care must be taken not to put off the operation till the time the insects retire to

deposit their eggs, for then the task would be endless and useless, as they generally choose the most secret places for that purpose, namely among the bark in the pits, chinks or crevices in walls, joints of the plant, and such concealments.

There are a great many Recipes for the destruction of the Pine Bug, most of which direct one or more of the ingredients to be used, which we find laid down by Nichols; and as the only article that may be said to be of any use is the soft soap, the subjoining of Nichols's and Muirhead's Recipes shall suffice.

NICHOLS says, "take soft soap one pound, flour of sulphur one pound, tobacco half pound, nux vomica an ounce, soft water four gallons; boil all these together till the liquor is reduced to three gallons; and set aside to cool. In this liquor immerse the whole plant, after the root and leaves are trimmed for potting. Plants in any other state, and which are placed in the bark bed, may safely be watered overhead, with the liquor reduced in strength by the addition of three parts water. As the Bug harbours most in the angles of the leaves, there is the better chance that the medicated water will be effectual, because it will there remain the longest, and there its sediment will settle. The above is a remedy for every species of the Coccus, and for most insects. On account of its strength and glutinous nature, its application will make the plant look dirty, therefore as soon as the intended effect may be supposed to have followed,

whatever remains of the liquor on the leaves, should be washed off with clear water. It would be improper to pour a decoction charged with such offensive materials over fruiting plants. This peculiar dose, for a tenacious insect, is not to be applied indiscriminately to exotics in a general stove, as it might make the more delicate leaves of shrubs drop off."

MUIRHEAD, in his communication to the Caledonian Horticultural Society, says, "First take a small brush, made of bass mat, tied on a small stick, flat on the end, to go down to the under end of the leaves, where the Bugs harbour most. Brush and water them as well as possible, then put one pound of flour of sulphur to a common garden-pan full of water, if a little more there is no danger of injuring them. The quantity, according to the number you have to clean. Put the pine plants into this liquor, and let them remain twenty-four hours. Be sure they are all covered, which may be done by putting a board over them, and a small weight on it. When they have been immersed for twenty-four hours take them out, set them on end, with their tops down; let them stand till they be dry, then pot and treat them as plants not infested."

In respect to NICHOLS's Recipe, the most useful article which it contains is the soft soap, and that only will be of use applied at proper times, as I have before stated, and all the others may be properly dispensed with as useless. But

I would say that a'though the soft soap may destroy the insect, yet the other kinds, brown or mottled soap, will not be found so disagreeable nor so injurious to the plants, and as there is but little difference in the expense, I should therefore recommend them to be used in preference to the black or soft soap.

MUIRHEAD'S method of cleaning with the brush and water will, no doubt, destroy many, but it appears a very tedious operation, and although it may be done ever so carefully many will escape it in those parts of the plant where the brush cannot be got to. If the sulphur is applied to kill those escaping the first operation, I cannot see any reason why it may not be done at first, so as to prevent the trouble of brushing, for if the few are destroyed by it, it would be ridiculous to suppose that the great bulk would not be liable to the same fate, after being immersed twenty-four hours in the solution! If there is any merit in the latter method for their destruction, it is not produced by the sulphur, but by the insect being so long immersed under the water, for unless they were either equatic or amphibious animals, after so complete a ducking none could escape: at all events the sulphur will not destroy them the way that it is recommended to be applied, and indeed were it destructive to them, this author has neglected to mention the proportionate quantity of water and sulphur, and left us to find it out. He tells us to put a pound of sulphur to a com-

mon garden-pan full of water, but unfortunately there are many different sizes, from a quart to four gallons, and all common: however, as the sulphur is of no service, we are not much disappointed by the neglect.

WOODLOUSE, *(Oniscus.)*—This tribe of insects proves injurious to the foliage of various kinds of plants, and also some kinds of fruits, especially those growing in pits and frames, where the materials required for the assistance of their growth, consist of tanner's bark and tree leaves.

FOR THEIR DESTRUCTION.—When it is necessary for those materials to be removed, all the remaining concealments should be well watered over with boiling water, which will readily destroy those not carried off by the removal of the soil. At any time when those animals prove injurious, or likely to be numerous, lures of Bean straw, old Rasp stems, or similar materials, from the thickness of ten to fifteen straws or stems, should be laid round the pit or frame sides, sunk a little into the materials which the beds are composed of, leaving them uncovered; then scatter over them pieces of Cucumber leaves, such as are decaying, or decaying leaves of most kinds will do, which appear to be more attractive and agreeable in that state, than the healthy growing ones. In two or three days after water them over with boiling water. It will be proper to observe that their destruction will be best accomplished before there is much

concealment for them, by the plant increasing in growth. For instance, Cucumbers or Melons will form a complete retreat for them, if they are not destroyed while the plants are young, before they extend much over the beds.

SLUGS will be found troublesome in gentle forcing houses and frames, in the autumn, winter, and spring months, by feeding on plants in pots, the bursting buds of Peach and Nectarine trees, &c. Lime-water (No. 13) must be poured among the pots, and in all parts where they are likely to be concealed; and in some cases lures of Cabbage leaves, Bean straw, &c., may be formed and frequently examined to gather up the Slugs there residing.

ANTS are sometimes very annoying to plants in pots, by making their retreat or harbours among the roots. These may be destroyed by pouring the Mixture (No. 3*) freely into the pot, twice in one day, and those that have burrows in the pit or beds may have boiling water poured on them, in the most ready way.

VARIOUS TREES AND SHRUBS.

HARES AND RABBITS.—Various kinds of fruit trees, as well as many valuable shrubs and ornamental trees, for a few of the first years of their growth, are liable to be much annoyed by Hares and Rabbits, in the winter months, peeling

the bark off their trunks or boll to such a degree that very often the effect proves fatal.

FOR THEIR PREVENTION.—To prevent so great an evil, Composition (No. 16) must be done on with the hand, or brushed all over the stem, to such a height as the operator may suppose the depredators will be able to reach. They might also be completely protected by wrapping the stems round with hay bands. The operation is much more tedious than the former method, and there is also a greater danger of injuring the tree, if due care is not taken not to bind them too tight, so as to prevent the extension of the trunk and a free circulation of the sap.

ROBT. ELLIOT (Caledonian Horticultural Transactions) directs as follows, as an effectual preventive :—" Take three pints of melted tallow to one pint of tar, mix them well together over a gentle fire, in the month of November. Take a small brush, and go over the rind or bark of the tree with the Mixture, in a milk-warm state, as thin as it can be laid on with the brush."

J. SMEAL (Caledonian Horticultural Transactions) gives a similar plan :—" Take Hogs lard, and as much Whale oil as will work it up to a thin paste or paint, with this gently rub the stems of the trees upwards, at the fall of the leaf."

MILDEW.—The disease commonly called Mildew, proves sometimes a most pernicious malady to several kinds of fruit trees, shrubs, vegetables, and flowers. It will frequently be

detected on Peaches, Nectarines, Apples, Thorns, Laburnums, and numerous other plants. Its appearance on the leaves is somewhat like meal or flour thinly dusted on, and on the young shoots it appears thicker, and more glutinous, but still mealy. In respect to its nature there are various opinions; by some it is considered a species of the Fungus, by numerous others it is supposed to be caused by insects.

ROBERTSON (Horticultural Transactions, 178,) considers that it is a minute Fungus, of which different species attack different plants, and has found sulphur the only specific cure.

KYLE (Caledonian Horticultural Transactions) considers it is caused by an insect; "the Mildew is occasioned on Peach trees by a very destructive insect. I was very much hurt with it here, and tried several ways, but could not get clear of it till I watered the borders with Cow urine, and for nine or ten years I have not had the least appearance of it. I give them a watering at the winter dressing, the end of Nov. or in December, and then another after they set a growing."

WEIGHTON, (Caledonian Horticultural Transactions,) after enumerating various diseases fruit-trees are liable to, says, "The Mildew does much more injury to Peach trees than any of the former. It is still uncertain whether it proceeds from the soil or from the air, or whether it be an insect or fungus;" after some other observations, he goes on to state his remedy,

" the Mildew may be kept under (I cannot say be cured) by washing trees affected by it with a Mixture of sulphur and lime-water. My mode of application is by the garden engine, with a little soap, or any other thing that will separate it from the trees. It cleans them at the time, but does not prevent the Mildew from returning." He also has introduced his friend John Hay's method, which is, " whenever Mildew was observed to affect a leaf, or the point of a shoot, the diseased leaf was picked off, the point of the shoot dipped in water, in which black soap had been dissolved, and it was well dredged with a bellows puff filled with sulphur. This was done in an evening, and washed off with the engine the following evening."

T. Scougal, (Caledonian Horticultural Transactions) recommends a clay paint as being the best remedy for the Mildew he ever tried: it is prepared as follows: " Take a quantity of the most tenacious brown clay that can be obtained, diffuse it among as much soft water as will bring it to the consistence of thick cream or paint: pass it through a fine sieve so that it may move perfectly smooth, and free from any gritty particles." This he appears to apply with a brush at the time of training, over the whole tree.

Alexander Hay (Caledonian Horticultural Transactions) directs " two pounds flour sulphur, two pounds soft soap; add them together, with as much boiling water as will bring them

to the consistency of paint." With this he anoints the whole tree at the time of training, in the winter or early spring months.

The following Recipe was obtained from an old experienced Russian gardener, by Mr. Cale, which he communicated in the Caledonian Horticultural Transactions. "Take one quart of watky, (a Russian spirit, prepared from the distillation of Rye, and resembling in every respect the whisky of Scotland), two pounds of powdered sulphur, two ounces of copperas, and a small quantity of camphor, dissolve first the camphor, reduced to powder, gradually in the spirit, then dissolve also the copperas in it, then rub in gradually the powdered sulphur in the solution, when the whole will form a Mixture of a thickish consistence." The above is applied with a brush at the winter or early spring pruning over the whole tree.

KIRK, (Caledonian Horticultural Transactions), Gardener at Smeaton, says, "when I got the charge of these trees, twenty-one years ago, they were over-run with Mildew, and in a very unhealthy state, insomuch that most of them were to appearance not worth keeping. I examined the earth about the roots, and found that the soil, having been much exhausted, a great quantity of dung had been given. I took this old soil wholly away, and put fresh soil, procured from a very old pasture, to the roots of the tree, without any dung, always exercising the greatest care possible not

to injure the roots. I only treated a few trees in this manner the first year, but I found it to answer well, and I afterwards went over all the Peach trees in the same manner. I have continued giving them a little fresh soil from old pastures every two or or three years since, always without any dung." By adopting this plan for the last twenty years, he states that he has not had the least appearance of Mildew.

HARRISON'S Method.—"Peach and Nectarine trees are very frequently attacked by this disease, particularly so in low damp situations, because in such there is generally stagnant water, at the bottom of the soil, which is almost certain to produce the Mildew, without great attention has been paid to draining, &c.

"There are some kinds of Peach and Nectarine trees very subject to this disease, and in which it seems to be inherent, but it appears more or less according to the favourableness or unfavourableness of the situation in which the trees are planted, or as they may be affected by the weather, which will also produce it; for although a border be properly made and adapted to the trees, yet if very foggy weather continues for a few days, and the soil of the border is not in a state of moisture similar to that of the atmosphere, the trees will be generally attacked by the Mildew; but when the weather is foggy, and the border is in a tolerably moist state, to the depth and extent to which the fibrous roots run, the trees will rarely

be attacked by this disease. This may easily be proved in a Peach-House; for let the border be kept dry, and keep the house for a few days in a steam, and the trees will soon Mildew. This circumstance I have observed for many years; I have uniformly found it to be the case. Mildew will also be produced from the soil of the border having been planted in for many years, and during that period not having had a renewal of fresh soil mixed with it. In that case a renewal of the border is indispensable in order to prevent the disease; therefore it must always be endeavoured, in continued foggy weather, to keep the border in a proper moist condition. This may be effected by giving it one good watering so that the water will sink to the depth and extent of the fibrous roots.

" When the borders in which the trees are planted have a great inclination, so that rain will run quickly from them, the trees will be generally attacked by Mildew, and the leaves of the trees will also be frequently curled and blotched. In this case attention must be paid in watering, mulching, &c. When copings of walls are so constructed that the drip from them falls upon the trees, it likewise frequently causes the Mildew. But if the directions given in this work in reference to a proper soil for each kind of fruit tree, making of the borders, and watering the tops and roots of the trees, be carefully attended to, they will be rarely attacked by the Mildew.

"The following operation is what I have adopted with great success as a preventive of Mildew, &c. Just before the bloom expands, the trees are sprinkled with water, after which they are dusted all over (particularly the young shoots) with common sulphur, mixed with a little Scotch snuff or tobacco dust. The beneficial effects of this practice I have satisfactorily realized for many years. However, when a tree is affected by Mildew, let it be immediately sprinkled with soap suds, and then be dusted over with sulphur and snuff as before described. It is the practice of many persons to wash those trees that are affected with Mildew frequently with soap suds and urine, and other mixtures, which repeated washings tend to promote instead of destroying it; it is also the practice of others to renew the soil of the borders, but although this is advantageous in some respects, it will not be an entire preventive of Mildew, because the state of the weather and borders, as before described, will affect the tree in some degree."

FORSYTH observes, "the Mildew, a disease very hurtful to plants, is a kind of thick clammy moisture, which falls on, or rather transpires from, the leaves and blossoms of plants. This clammy substance, by stopping up the pores prevents perspiration, or hinders the growth of plants. It is commonly called Mildew, and there is an insect which is frequently found in vast numbers feeding upon this moisture."

J. S. SEGARS, in a treatise upon this subject, says that, " the Mildew is of a very sharp corrosive nature, and by its acrimony hinders the circulation of the nutritious sap, in consequence of which the leaves begin to fade, and the blossom and fruit are greatly injured. I have observed that, contrary to the common opinion, trees are more liable to Mildew on south and east walls. When they have perfectly recovered, whenever you apprehend danger wash or sprinkle the trees well with urine and lime-water, and when the young and tender shoots are much infested, it will be necessary to wash them well with a woollen cloth, dipped in the following mixture, so as to clean them of all the glutinous matter, that their respiration and perspiration may not be obstructed."

This Recipe is the same, or nearly so, as that laid down by Forsyth, who most probably was the inventor. " Take tobacco one pound, sulphur two pounds, unslacked lime one peck, and about one pound of Elder buds; pour on the above ingredients ten gallons of boiling water, cover it close, and let it stand till cold, then add as much cold water as will fill a hogshead. It should stand two or three days to settle, then take off the scum, and it is fit for use."

Although I have spared no pains fully to comprehend this mysterious disease, its cause appears to me yet undiscovered. My investigation leaves me quite decided that it is not produced from an insect, an opinion which has so long existed. Cer-

tainly insects may be found feeding upon the mealy substance produced. There is commonly found in the middle of summer, a very minute reddish coloured larvæ feeding, which for some time kept me wavering as to whether it was the cause, but I am now decided that it is not, which may easily be proved by noticing plants of any kind subject to the Mildew early at the spring, at its first appearance, with the aid of a glass, at which period these little animals are not in existence. Aphides may be found upon some of these shoots, but they produce no such effect.

The cause presenting itself to me as most likely, is from the sap being disordered somehow or other, either in setting of from the roots, by absorbing improper nutriment, or in its ascent through the arteries of the branches, or probably in the process of elaboration of the sap which is said to take place chiefly in the leaf, from the finer vessels of which a portion of the sap transpires. It is probable that the sap in passing through this process, or in circulating through the various vessels, either in the ascent or descent, either by internal or external obtrusion becomes disordered, so as not to be evaporated or dissipated in fine vapour, but to be discharged from the leaves and young wood in a thick grossy state; and to accumulate on the infected part, and exhibit the disease in the state we find it.

It is doubtful whether any external application, as prescribed by some of the foregoing au-

thors, will be found at all useful. At any rate neither the sulphur, soap suds, lime, nor urine, has a proper effect to eradicate it, when applied in a diseased state. If any one of them is at all useful, it will be, on being applied at the time of the winter or early spring training, as described by Scougal, Hay, Cale, or perhaps at the time Harrison recommended, just before the expanding of the blossom. Those latter processes I have not been able to prove by experience, therefore I cannot speak of their efficacy, but I think the best preventive will be that of choosing proper soil and culture.

In the first place, if it is necessary, that is, if the soil be of a wet, cold, clayey nature, steps should be taken to put it in a proper state, in the manner that Forsyth, Harrison, and others direct. Perhaps it may be proper briefly to give a few hints as to the mode that should be adopted.

First, a trench must be made across the border or plot, say three or four feet wide, and to such a depth that it will admit of from 20 to 24 inches deep of proper soil. At the bottom of which a drain must be formed, about five or six inches deep, and about the same width, which must be filled with stones or gravel, two or three inches above the top of the drain. The remainder of the trench is to be covered over with stones, gravel, brick rubbish, or it may be paved with brick, or small pieces of flags, to about the level of those stones forming the drain. The whole is then to

be covered over thinly with refuse of lime, say an inch or thereabouts in thickness; brush it about with a broom and water, so that it will fill all the crevices. This will prevent the roots penetrating into the bad soil below, and yet will admit of the moisture passing through.

That space being done, the best soil of the next removal or trench may be lodged upon it, which must be mixed with any or all the following articles: Tanners' bark, old decayed sticks and leaves, coal ashes, and always a good portion of pasture soil, that has laid half a year in a heap, or if only just taken fresh from the field, it will do, if moderately chopped in pieces. If the land is strong and tenacious from whence it is taken, the thinner the sod the better. From two to three tons, or the same number of one-horse loads of rotted manure, will be sufficient for a hundred square yards. I mention this because there is often much damage done by crowding a great body of fresh stable manure into fruit borders, especially when the trees are immediately planted amongst it.

In cases of cold wet soil it will be of further service to mix with the earth, at the bottom, a good portion of stones, leaving a depth sufficient so that the stones may not be turned up by the spade. In the process of trenching it will be necessary to form a drain in the above manner every nine feet, and have all the former operations proceeded with, and in this way the whole may be carried

on to the extent required. Those drains may be directed into a principal one formed in the walks, purposely for the above object. It will be perceived that the above materials are introduced principally to bring or reduce the original soil to a kind texture, so the operator will judge of the quantity required, according to the state his soil is in.

FORSYTH recommends, if the soil is strong or inclined to clay, that it should be mixed with light mould, sand or old lime, also rotted leaves or street dung, and also says, " where the soil is a sour wet clay, it will be necessary to throw into the bottom of the borders brick-bats, covered with lime, rubbish, or core from the skreening of lime, then water it, and, when nearly dry, ram it well, which will convert it into a hard surface, and prevent the roots of the trees penetrating the wet earth below."

I would observe that generally the sod and earth from two or three inches to about a good spade's depth, from pasture land, will be found preferable to most others, for the formation of fruit borders, and land possessing a moderate portion of stone will also be found most generally suitable to the growth of fruit and other trees, providing the earth is possessed of good qualities.

I am of opinion that the mildew in Peach houses is produced often from frequent watering over the trees and soil in dull cloudy weather, or when the houses are so much clothed with foliage,

as not to admit of the sun's rays purifying and clearing away the stagnant damps, and exerting their natural powers on the soil in which the trees are planted. If watering was judiciously attended to, mildew would not be so prevalent, providing the soil in which the trees grow is good, and under proper culture. I would say, water pretty freely and seldom; I mean do not water every day, or every other day, but rather about once a week, and I should suppose once a week, or even once a fortnight too often for a general watering, except the weather is very hot and dry. I do not say that slight watering, for the purpose of creating dew or steam, should not be oftener adopted; on the contrary, I believe it to be highly necessary in the evenings of hot weather.

I would just remark here, that when fruit trees of any kind have been some time planted, and extended their roots to a considerable distance, it will be most proper to water all over the borders, where it will be likely to meet with the fibrous roots, and not confine the application close to the stem of the tree, as we too often find practised. It is there seldom of much service, as the moisture is principally absorbed by the finer roots, of which there are generally but few near the trunk or stem of moderate sized or large trees.

CANKER.—This is a disease common to Apple, Pear, and other trees, more especially the former, to some kinds of which it proves a most

destructive complaint. The Ribstone Pippin, a well known favourite Apple, often falls a victim to it. There are others firm or hard wooded kinds of Apples annoyed with it, but seldom the Codling kind. The Jargonel may be said to be the most liable to the disease of the Pear kind. It generally commences at a decayed bud, spur, or branch, and sometimes in the trunk and thicker branches, where there are no buds or spurs, and appears first from a rend or crack in the bark, apparently owing to its being too contracted. It appears at first about the spur and bud with only a smallish brown spot, but gradually decays to a considerable extent. Its course often spreads round the whole of some branches and stems, so that the sap is void of a passage, and, as a matter of course, the upper part dies.

It is not to be supposed that all the rough, rusty appearance we observe so often on the trunks and branches of various kinds of trees is connected with this disease. The complaint in question is both external and internal, so as not only to destroy the cuticle, but the woody part also. There are several opinions as to the cause of the Canker, but the mystery appears too much for any one to clearly unfold. I am inclined to believe that cold wet summers, and severe winters, and also strong wet soil, are productive of the complaint. If we notice the few late dry summers, we shall find that fruit trees, that were previously much infested, have scarcely exhibited

any symptoms of it, more than the old wounds that may not yet have become healed; and shall also find, even in cold summers and severe winters, that where trees are growing in dry stoney soils, and warm sheltered situations, they will be rarely infected. We further see, that the Ribstone Pippin and the Jargonel Pear are not at all visited with this complaint when trained against walls, providing the soils are not too wet and cold, while those in the open ground, in the same vicinity, are nearly destroyed.

I should recommend, to avoid this disorder, that plantations should be made in warm situations, and warm, kind soil, and where nature has not done it, art must be used, as directed for the prevention of the Mildew. If it is not necessary to pave and prepare the bottom to the extent directed for Mildew, on account of the soil being pretty good to a considerable depth, yet it will still be found very beneficial to form the paving as there laid down, to the extent of four to five feet round, that when the trees are planted in the centre, the first root may be directed horizontally, which not only renders it serviceable in preventing the root striking downwards into improper soil, but is also of essential service in bearing the root upwards, where it must naturally reap a greater share of warmth, which appears to be highly necessary for the promotion of health in the plant. When old quarries lie contiguous, so as to be under protection, they may be advantageously appropriated

to the growth of the most delicate kinds subject to this disease, by introducing a sufficient quantity of soil over the bottom of them, previous to planting. I would once more observe, it will be of great importance in the formation of fruit partments, where land is wet, cold, and tenacious, to introduce a good portion of stones, and I recommend the omission of labour, in endeavouring to clear land of stones, which appears so much aimed at by many. Certainly in dressed grounds they are offensive to the eye; in such cases they should be removed as far as it is necessary to render it pleasant. I do not mean to say what is deemed necessary shall not be removed in other places, but I think it will be allowed, as I before said, that a sufficient portion will be necessary to produce warmth, create and encourage the fibrous roots, not only in clayey soils, but also in those of a lighter nature.

FORSYTH says "Apple trees are liable to be infested with the Canker from the following causes, viz. From injudicious pruning; from the foot stalks of the fruit being left on the trees; and from injuries sustained by applying ladders in getting fruit; these injuries are very hurtful to the tree, and will infallibly bring on the Canker, when no remedy is applied. A man ought to stand upon steps instead of a ladder, when the fruit is not within reach of the ground; care should also be taken in nailing, that the shreds be not too tight, which causes a swelling in the

shoots, and very often produces the Canker. Another cause of the Canker is when we have very wet autumns, such as that of 1790, which prevented the young wood from ripening and a hard frost setting in after, kills the young shoots. These, if left on the tree, will bring on the Canker, and increase its rapidity. Birds, and insects devouring the buds, will have the same effect. Careless people frequently leave the dead shoots on the tree throughout the summer, which will infallibly bring on the Canker; some even leave them for years, until the tree is totally killed; they should be cut off at the end of April or beginning of May, as by that time you will be able to see how far the disease has advanced."

He further observes, "it is a general opinion that the Canker in all trees proceeds from the nature of the ground in which they are planted, such as sour clay, a thin or gravely soil, &c." He also observes, "the Canker proceeds from bruises in the bark, from limbs cut off, &c. When these limbs begin to rot and grow hollow, they canker to the root, for it always proceeds from the branches and stem to the roots, and from the roots to the tree."

THE GUM.—This is a disease incident to stone fruit, which appears to be caused by bruises, injudicious pruning, and immature shoots or branches. In pruning, when branches are not closely and clearly taken off, but a portion left on,

it not only decays, but the disease is insinuated into the parts connected with it. The sap here becomes disordered, more especially in wet autumn and spring months, which appear greatly to promote the exudation of the sap. It then becomes thickened, and coagulates on the diseased parts, and assumes the appearance of gummy matter, as we find it. This disease often proves of a serious nature in cold situations, and wet cold seasons, especially to the Peach, Nectarine, and Apricot. It will be of importance to attend to proper pruning, and to use every means to mature the trees sufficiently early in the autumn, which will be greatly aided by keeping the wood thin and close to the walls through the summer, and also by using fires to such walls as are flued, a little in the autumn, especially if it is wet and cold at that period. When this disease presents itself the Gum should be taken away, and all the infested part cut clean out, and the Compost (No. 16) be applied, and to prevent the Gum appearing on bruised parts, or those parts where large branches are taken off, the Compost should be applied at the time, so as to keep the weather from affecting the disease, and encourage the wound to heal.

FORSYTH says, " the Gum is a kind of gangrene, incident to fruit trees of the stone kind, and arises from the following causes: from injudicious pruning, from bruises, or any injuries received in the wood or bark. This may happen

from strokes of the hammer in nailing, from pinching the shoots by nailing the shreds too tight, or by driving the nails too close to the branches. It may also be occasioned by leaving the footstalks of the fruit, or by pruning in summer, and cutting the shoots too short, and by injuries sustained by a careless application of the ladder in nailing and gathering the fruit, &c.; but it particularly originates when large limbs have been lopped or broken off. This disease may be known before the Gum itself makes its appearance. The bark at first becomes of a brownish colour, which gradually grows darker, till at last the Gum begins to ooze out like little blisters. As soon as any of these symptoms are observed, the infested part should be cut out with a sharp instrument, and the composition and powder applied immediately; you must observe to cut out the Gum perfectly clean; you will see it oozing out from the wood and bark. This must be followed till you come to white wood or bark. If afterwards any Gum should make its appearance it must be scraped off, which is best done when it is moistened with rain, as you can then scrape it off easily, without hurting the bark. This must be done without delay, otherwise the disease will rapidly advance."

WOUNDS IN TREES.—So much has been said and done about curing decaying and accidental wounds of trees, that it appears useless for me to advance any thing on that subject,

but it may be proper to observe, that so little depends on the healing virtues of any ingredient that can be introduced in any of our Composts, that I believe the most essential point to be aimed at will only be to keep off the weather, from the wound, so as to encourage the juices to approach as near to the edges as possible. This no doubt may be done with all the various prescriptions advanced, even the common grafting clay will have the effect, if properly applied; and I have found, where stems or branches of trees have been wrapped round with hay bands, woollen cloths, and similar coverings, so as to keep out the weather, that the wounds have been completely and quickly healed. The Compost I have directed on that head will be readily procured, and in every respect I trust answer for what it is intended, for it is calculated to adhere to the wounds and resist the weather. The decaying part, and accidental wounds of trees should be cleared of the infected portion so as to be left smooth and even, then the Compost (No. 16) is to be applied so as to fill up the hollow or wounds, even or level with the healthy parts, being careful to include the edges of such healthy part with a thin covering of the Compost. Those parts where large branches are taken off, should be smoothed even, and then coated over with the Compost, which will greatly encourage the sap in repairing the damage.

Moss and Lichens.—In some situations trees are much annoyed with various species of

Moss and Lichens, especially in damp confined situations, where there is not a free circulation of air, and the sun's rays are shut out.

Mr. Thos. Bishop, in a communication to the Caledonian Horticultural Society, for the eradication of this disease, says, "At any convenient time, between the fall of the leaves and reopening of the buds in spring, when the trees are perfectly dry, take a quantity of quick lime, either in shells or recently slaked, and thereof make a strong solution or mixture with water. Immediately apply the same as a washing to the trees infested, either by means of a watering pot, with a wide rose, on the lower trees or bushes, or with a common garden engine, to those of greater height. If there are many trees to be washed at a time it is better not to make up the quantity of liquor at once, that may be necessary to wash the whole, but to add occasionally more lime and water into the vessel, stirring it frequently when used. The effects of this remedy will first appear by changing the colour of the Lichens to a darker green, and whenever the rays of the sun alight upon them they will assume a brown colour and shrivel up, as if scorched with fire; from which time they cease to draw any more nourishment from the trees, but will in a few months begin to drop off, and will wholly disappear before the ensuing winter, when the bark of the trees will regain a smooth glossy appearance, and the vigorous shoots of next summer will clearly exhibit the deliverance afforded them."

By some people slacked lime is directed to be dusted over the infested part when the trees are wet; I should think this would be more readily done, and equally effectual.

BLEEDING VINES.—If judicious pruning is not properly attended to, Vines are sometimes apt to evacuate a considerable quantity of juice. When that is the case, the following Remedies are recommended:—

SPEECHLEY'S remedy is to peel off, or divest that part of the branch adjoining the wound of all the outside bark, then with a spunge dry up the moisture, and immediately wrap round the wounded part a piece of an Ox's bladder spread over with tar or pitch, made warm in the manner of a plaster; then tye the whole secure with strong thread, well rubbed with Bee's wax; this must remain for three weeks or a month, on the Vine.

KNIGHT'S Remedy consists of four parts of scraped cheese, to be added to one part of calcined Oyster shells, or other pure calcarious earth, and this composition to be pressed strongly into the pores of the wood; this done, he says, the sap will instantly cease to flow.—(Hort. Trans.)

CUCUMBERS.

CANKER.—The complaint generally called Canker, common to Cucumbers and Melons, often

proves a most desperate malady. Although this disease has been so general, (no doubt throughout the kingdom), yet in none of the treatises upon the growth of this genus, has the cause of this mysterious disease been satisfactorily unfolded; at least not as far as my observation extends. By some it is thought to be produced by insects. This is, however, a misconception, for I have paid minute attention to ascertain the fact, but never discovered any likely to produce that effect. It seems, when this complaint appears, as if the sap had become disordered, some how or other, so as to be obstructed in its regular courses, and not to be properly evaporated in fine vapours, but to burst the delicate rind of the branches, leaves, tendrils, and fruit, and exhibit brown or rusty ulcers, whereby the Vines are sometimes completely stopped in their growth, and the fruit and branches will often be found to exude a portion of coagulated sap or matter. The fruit thus affected is rendered quite bitter and useless.

I am disposed to think, from the attention I have paid to this subject, that this disease is principally produced from too much water being applied, at improper periods, and from stagnant damps lodging about the plants. I should submit to those who have to contend with this disease, the following suggestions: The site proper for the Cucumber ground should be such as to have the frames fronting to the eleven o'clock sun, and it will be of great

importance to have it well sheltered from east, west, and north winds, by walls, or thick growing hedges, behind which there should be plantations of trees at proper distances, which will be highly serviceable in breaking those hurricanes that would otherwise do much injury, by checking the beds, retarding the growth of the plant, and promoting the disease, especially if the plants have been tenderly nursed.

The manure used for Forcing or Hot-beds should never be suffered to get too wet, either before or after the bed is made, which causes it sooner to decay, and form a solid receptacle for retaining moisture about the roots. The stable manure most suitable for retaining a proper heat the longest and most beneficial for the growth of this plant, will be that which is neither wet nor dry, and which is rather inclined to mould than otherwise. It should have been several weeks taken from the stables, and in the course of that time have been turned over twice or thrice, and mixed well together. The heaps thus turned should be finished in a pyramidical form, so as to become free from the wet.

The earth most proper to be used is of a light texture. Sods from two to six inches thick, taken from old pasture land, will generally be found suitable, after lying a year or more in a heap, with a moderate portion of rotted manure. Decayed tree leaves, with the addition of a small portion of kind soil, is much and very properly

recommended. The soil should never be worked or put in use in a wet state, as it is thereby liable to set hard, and to be rendered unkind. For early forcing, it should be protected from wet a few weeks previous to its being wanted for use. It is said by some that using soils more than once brings on the Canker. This is not the case. Some of our first Cucumber growers use the same soil for several years, with only adding a moderate portion of decayed manure, and allowing the whole to be exposed to the weather through the autumn and winter months, with the greatest success.

When the bed is ready, a flue should be formed in the centre, where each plant is to be planted, in the following manner: Two bricks on each side may be joined end to end, directing a line from the back to the front of the frame, on the surface of the manure, leaving a space of about six inches betwixt them. They will require covering with a grey or blue slate, about a foot wide and twenty inches long, or tiles may be made purposely of clay, being of a flat round at the top, and having sides of three or four inches deep, so as when fixed on the bed, it may form a similar flue to that made of bricks and slate.

This practice will answer two essential objects. First, it will afford a good opportunity of planting out the plants permanently, as soon as the bed is warm enough, without waiting the decline of the strongest heat, providing the effluvium of the bed is so pure as not to injure the

plants; or should the heat of the bed become violent, this method prevents any danger of the plants being scalded, owing to the flue being open at each end, to let out the steam, which would otherwise be confined, and scald the roots. At the same time, to prevent the top heat being too strong for the plant at so early a state of the bed, it will be necessary to allow it to escape a little both night and day out of the frame, as long as the heat remains in that state, by tilting the high end of the sashes, more or less, as it is thought necessary, only it must be observed to keep out the sharp air, by hanging garden mats, or any thing similar, over the part open. When the bed is not too hot, the flue may be closed up at each end with earth.

The next important object this method effects is, that it will prevent the principal roots penetrating the bed too deep, and also hinder stagnant wet from lodging about the bottom of the stem to which the principal roots are united, which is too often found to be the case when watering is not judiciously applied, and proves injurious to the plant. It will be proper, in the next place, to lay over the remaining surface of manure, about two inches in thickness of wheat, oat, or other straw. This will admit of the heat rising properly, and at the same be a great prevention against too much wet lodging about the roots. When this is done, the earth to

be used may be laid over the slates and straw as it is required, to the depth of from 8 to 12 inches.

I will now give a few brief directions for managing these Plants. In the first place I may mention, that a regular heat is highly necessary for their growth. I mean that they are to be kept from extremes; for Plants exposed at one time to a strong heat, which is allowed to decrease suddenly, are of course materially injured. It is impossible to keep the air in the beds at any certain and precise degree of heat, therefore I shall only mention the two extremes. In the winter and spring months it should be from 60 to 80, and in summer from 55 to 65.

As soon as the second rough leaf of the young Plants is beginning to expand, or when the bud at the second joint is sufficiently advanced to be readily taken off with the thumb and finger, or a small knife, it must be done, so as not to injure the Plant. After this, when the Plant has thrown out branches, so as to show two or three joints, the end of each should be pinched off pretty close to the second joint, or at least at the third. This will generally cause each Vine to throw out shoots at each remaining joint, and if the Plants are of a prolific kind, those shoots will generally be found to show fruit at the first joint. As soon as the fruit becomes pretty observable, and the end of the shoot so far grown that it can be taken off without injuring the fruit, it must be pinched off

moderately close, being careful not to leave a joint above it; and at all times after this, at the appearance of fruit, the same process must be adopted. If no fruit appears at the first joint, as above, the shoot should still be stopped at the same joint, or the whole shoot may be pinched off, leaving only one joint. This sort of treatment is not only of importance in rendering the plants productive, but, owing to their being brought into a bearing state, the plants are prevented growing too luxuriant and crowded, by which a sudden amputation of the greater part of the Plant is sometimes rendered necessary. I need scarcely remark, that an excessive pruning, like this, must throw the whole system of the Plant into disorder. Moreover, the Plant, while in a crowded condition, is very likely to be infested with the Canker, especially in cloudy, showery weather, owing to its perpetually lying in the midst of stagnant damps, which cannot properly pass off or be dried, the surface of the bed being totally deprived of the sun's rays.

The next important thing to be observed is the process of watering. Nothing need be said about the kind of water to be used, as nature at once tell us that rain or soft water is most congenial and proper for the promotion of vegetation. In cases of a deficiency of that kind of water, spring or hard water may be improved, by being kept a few days well exposed to the sun in vessels.

It will be of importance always to have the water made a little warm, previous to its being used, in the winter and spring, viz. from 60 to 80 degrees, and also when the weather proves cold in the summer, for the application of cold water, to plants tenderly nursed, must naturally produce a sudden transition in the state of the sap. The quantity of water necessary for these plants, will of course vary materially, according to the state of the plants, beds, weather, and nature of the soil; but, unfortunately, it is a rule with some growers, to use a regular quantity of water, whether the bed on which the Plants grow is hot or cold, or the atmosphere bright or cloudy. No exact rules can be laid down for the process of watering, as it will be very much affected by circumstances; and nothing but practice can give the learner the proper knowledge. I may, however, venture to suggest the few following remarks, which, I trust will afford some useful information to young practitioners.

While the Plants are remaining in the pots, where they were first sown, if the bed should not be of sufficient heat, and the weather dull or cloudy, especially if the Plants are crowded, no water should be applied, till the moment they are about to be removed into other pots, as they are liable to decay or damp if near the surface of the earth. Those Plants, from the time of their first removal into the nursery pot, are subject to the Canker, in stagnant beds deficient in heat, and

therefore water must be sparingly and cautiously applied, and a speedy renewal of the heat will be necessary.

The Plants, when first planted in their final situation, will generally require a little water to saturate the earth about the roots, say about a pint, except the earth is sufficiently moist, and the frame well supplied with steam, or when the weather is cold and cloudy, it will be proper to abstain from applying any water. As the Plants advance in their growth, it will be proper to water over the whole earth in which they are growing. The water must not be directly poured upon the stem of the Plant; this I consider to be a pernicious practice, and therefore should recommend it to be avoided as much as possible. Indeed, after the Plants have attained to a moderate size, it appears useless to apply the water nearer than within four or five inches of the stems, as it must be allowed that the support of the Plants is imbibed by the fibrous roots, which are principally at some distance from the main stem.

It will further be of consequence, in applying the water, generally to avoid pouring it over the plants, except occasionally, in hot dry weather. The best way will be to use a small watering pan without a rose, and pour the water upon the earth, between the Vines: for we find young setting fruit and those in blossom, are very liable to be destroyed by the water falling upon them. I am per-

suaded that repeated watering upon the plants is one great cause of the canker, especially if it is resorted to when the weather proves ungenial to the plants. The most suitable period for the application will be at the warmest part of the day, in the winter and early spring months, and at those seasons when the sun becomes more powerful, early in a morning, any time from four to seven o'clock, and in all cases, as much as possible, those days are to be chosen which are likely to be clear and warm. This will be preferable to watering in the evening, as far as it regards the canker, as at the latter period the wet is allowed to remain too long and too abundantly on and about the plants without any evaporation, which appears to promote the disease, particularly if the weather is cold.

The quantity of water necessary for the plants cannot properly be adjusted, but I would observe, that when it is applied it should be used pretty copiously, about from one and a half to two and a half gallons of water for each light or group of plants, when they have arrived at a bearing state. In cold, cloudy, and rainy weather, it should no be applied oftener than once in from two to four weeks; even in summer and in hot dry weather twice a week will be generally sufficient.

Proper attention should be paid in keeping the glass and frames in good repair, to prevent the drip and beating rains entering the bed, for when the

rain happens to be pretty general, especially at a period when the weather is cold, it is very probable the canker will be promoted.

It is a practice with some Cucumber growers to cover the surface of the bed over with small pieces of blue slate for the Vines and fruit to rest upon. This method appears commendable, not only from its preventing the fruit and leaves being splashed with the earth in the course of watering, and the fruit becoming blanched while lying on the earth or other materials, but tends greatly to promote the health of the whole plants. The roots are induced to ascend to the very surface of the bed, and play against the slates, as a healthy exotic will do against the pot side in which it is planted. This practice also attracts the heat of the sun, and affords a congenial resting place for the tender fruit and Vines, besides protecting them against perni-damps, that might otherwise dwell amongst them. The process of watering will also be less necessary to be resorted to, and the whole bed is rendered tidy and cleanly in appearance. It must be observed that it is not intended for the slates to fit close together, or that they should be large, as small pieces will be preferable, owing to their forming more openings for the reception of water, when it is necessary to apply it.

I would just mention that there should be much caution used in the admission of air to the plants. The frames are not to be opened and shut

indiscriminately, without reference to the state of the air; for although the frame may become too hot in a clear sunny day, it will often happen that the air will be too severe for the plants. Under such circumstances it will be necessary, when the lights are propped up, for the purpose of moderating the heat in the frames, to hang over the opening canvas, garden mats, or some similar material, to prevent the sharp air or winds playing too powerfully upon the plants. Perhaps a more complete method would be to have a piece of fine wire-work fastened to the upper end of each light, and so contrived that when it is necessary to give air, it may serve the purpose of a prop, and at the same time be useful in tempering the air which enters the frame. I may further observe, that the common method of pushing the lights up and down alternately, for the purpose of giving air, should be abstained from, as in such cases, except the weather is very still and mild, the plants would be more liable to be injured than if they were in the open air, owing to the strong draughts which the operation would produce.

APPENDIX.

DESCRIPTION OF A SMOKING BELLOWS,

AND DIRECTIONS FOR USING IT.

Although the smoking bellows used in forcing-houses, &c. is pretty generally known, for the benefit of those to whom it may not be known, it will not be improper to give a description of it. The common bellows used for domestic purposes will be proper, with the addition of a cylindrical copper tube about five and a half inches long, and three and a half inches in diameter. A pipe about eight inches long, similar to the common bellows pipe, is fastened in the centre of the lower end of the tube; a concave plate of copper must be riveted on the bottom in the inside, minding that the convex, or round side, is placed upwards, and it should have 50 or 60 small holes in it to admit of the smoke coming out, and at the same time to prevent the fire and tobacco forcing out, when the bellows are in motion. The lid must have a socket about four inches long, fastened in its centre, to fix the bellows pipe within an inner plate, like the former described, letting the hollow side of the plate be next to the mouth of the pipe; the lid must have a rim about an inch broad to form a socket, in which the tube is fastened tight. A figure of the bellows is given in the Encyclopædia of Gardening, page 292. When the tube is required to be charged, the tobacco should be made quite damp with a little water, or tobacco liquor would be still better,

especially if the English grown tobacco is used, as it is not so strong as the Foreign grown: then charge the tube, leaving room for a few hot cinders to lie on the top of it; after the tube is fixed in the socket or lid, the bellows must be played to force out the smoke, as it may be required. To free the operator from the common and unpleasant situation of being involved in smoke, while in the act of performing the operation, a hole of a proper size to admit of the pipe only might be made at each end of the house, and middle, or in more places, according as it is thought necessary, from the size of the house. Care must be taken not to play the smoke closely upon any of the plants, as it would prove injurious to them.

REMARKS ON SHREDS,

USED IN FASTENING WALL TREES.

In all cases when shreds are intended to be used again, they must be put for a few minutes in boiling water, also any branches that are used for protecting blossom of fruit trees, or any other materials used about them, likely to be infested with insects in the spring should be immersed in boiling water a few minutes, in order to destroy the eggs or insects that may be there lodged. Here I may observe, that it is preferable to use shreds of cloth to any other mode that is practiced for training trees, as they form harbours for insects, through the winter, and afford a good opportunity for the insects and eggs of insects to be removed with the shreds, and destroyed with boiling water. This is contrary to the opinion of many, who say those shreds harbour insects, and, therefore, band or mat is recommended in preference, as they afford no protection to them. It must be allowed if there are no shreds to afford protection to the insects they will have other resorts, and, therefore, if they be in existence it matters not whether they have harboured in shreds, crevices of the walls, or trees, under stones, in the earth, or in other retreats, when their existence is not prevented.

DESCRIPTION OF THE WHISKS.

Whisks to be used in forcing the various liquid mixtures among the leaves and branches of trees or plants on which they are applied, may be made of a few branches tied together of common birch, broom, or any other fine twigged trees, while in their leafy state. It is intended that those wisks should not be too sharp or rough, nor used with too great a force, so as to bruise the leaves or fruit, but still to brush them smartly enough to disperse and force the liquor in fine particles all over the trees.

GARDEN ENGINES.

Garden engines are so common that I need not describe them. I may say that they are so useful that no horticulturist should be without them. Good tin ones, holding twelve gallons, may be procured at from 30s. to £2 each, which will last a considerable time, with care, but the copper ones are much preferable, owing to their durability. Good ones may be had, holding twelve or fourteen gallons, at the prices of from £8 to £10 each, in any of the principal towns.

In using the engine, the end of the pipe must be pressed tight with the finger, so as only to let the mixture come out like the finest rain, or a fine rose may be used instead of the fingers.

GROWTH OF TOBACCO, AND PREPARATION OF TOBACCO WATER.

When it is necessary that tobacco should be grown, for the destruction of insects, I would give the following hints. In order to produce it fine and perfect soon on in the Autumn, to afford a better opportunity of drying, it will be proper to assist the growth of the seedlings, by a gentle artificial dry heat. In this case the seed should be sown about the middle of March, and as soon as the plants are

at all fit to remove, they should be planted out into garden pots, one in each; the size suitable will be those of thirty-six to the dozen; or if the pots are larger, two or three may be planted in each. The whole, when potted, must still be protected and assisted with artificial heat, till the weather is mild, say the latter end of April or beginning of May. The principal thing to be minded will be, when they are to be finally planted, to have a ball of earth to each root, so that the plant may be checked as little as possible. As the plants of some species grow to a large size, it will be necessary to plant them in sheltered situations, at a distance from each other of from two to three feet, in moderate light ground. In the autumn months, when the leaves begin to lose their grossy appearance, and assume a yellowish hue, which will be first exhibited in the bottom leaves, the leaves that are changed should be taken off, and tied in small bundles of about half a dozen, or little more, and hung to dry. In about a fortnight after the first gathering most probably the whole will be ready to be taken off. After those bundles are in a proper state of dryness, the whole should be packed together streight and close, so as to produce perspiration, like what is necessary for new hay, in its proper state. If a sufficient quantity cannot be got at one time to produce perspiration, of itself, it may be greatly aided by packing it in a box, closing it up, and then covering overhead the whole box in a heap of weeds, grass, or manure that is in a gentle heat. After sweating a week or ten days, it may be kept in a moderately dry situation, so as to prevent its moulding.

It will require not less than a pound of the above leaves to a gallon of water to make good tobacco water, and in order to obtain the whole of the virtue of the

tobacco, it will be proper to let the water be poured over the leaves in a boiling state. The liquid may remain covered up a few hours, or till wanted for use. Before it is used the leaves must be taken out, taking care to have the whole water squeezed from them. Any quantity that is necessary may be made at a time, as it will be no worse for keeping, especially if kept air tight.

PREPARATION OF THE SOAP MIXTURE, &c.

It may be proper to notice that the following ingredients here introduced are not merely to make up a recipe without being of use; but the whole ingredients used have some effect of themselves upon the insects they are intended for, providing the mixture be made sufficiently strong; but where two or more are put together it will be found to be more effectual,—for instance, the soap of itself will kill all kinds of insects where it is introduced with the tobacco water as a remedy, and the tobacco water in such cases will have a similar effect. By the soap being added to the tobacco water and applied warm it is assisted to adhere to the insect much better; and the reason why tobacco is added to the soap when it would be effectual of itself is, that the soap if laid on too strong at some periods, would prove rather injurious, and therefore, with the assistance of the tobacco it answers the purpose much better. The proportions of the ingredients here laid down must not be much deviated from, or a proper effect would not be produced. The soap used is to be sliced thin, and dissolved in soft water, on a slow fire, which will be done in fifteen or twenty minutes, with only very gentle boiling. All the soap mixtures must be put on as warm as may be supposed the trees will bear without being injured. I may add, as a rule, if the hand can just be borne in the liquid without inconvenience, it will be in a proper state for use.

RECIPES.

Directions for the application of each receipe will be found at the conclusion of each subject treated upon in the body of the work.

1. Dissolve one pound of common soap, yellow or mottled, in four or more gallons of soft water; mix with it from three to four gallons of tobacco water, according to its strength, from the tobacco manufactory, and then add as much soft water as will make it up to 16 gallons.

Tobacco water, which we obtain from the tobacco manufacturers, is made from the washing of cloths used in manufacturing tobacco: it may be procured at from 6d. to 8d. per gallon, and may be conveyed in casks to any distance required. If the liquor is sufficiently strong it will be quite thick and nearly black. This liquor will be found much preferable to what can be made from the English grown tobacco leaves, as it takes so great a quantity of leaves to make it equally strong. If tobacco water made from English tobacco is used in place of the above quantities, let one pound of soap be dissolved in two gallons of soft water, and add 12 gallons of English tobacco water.—*See page 283, on its preparation.*

2. Dissolve one pound of common soap in a few gallons of boiling soft water; afterwards to be made up to 10 gallons; then add two gallons of strong tobacco liquor, from the manufactory; or, dissolve the soap in two gallons of soft water, then add 10 gallons of English tobacco water.

3. Dissolve one pound of common soap in two gallons or more of soft water; then make it up to five gallons, or not to exceed six gallons, with soft water.

4. Dissolve one pound of alum in a gallon or more of hot water, then add as much water as will make it up to eight gallons. It will greatly aid the alum to dissolve if it is pretty well bruised, previous to its being put into the water.

5. Add one pound of soap to five gallons of soft water, with an addition of two gallons of strong tobacco water; or one pound of soap dissolved in the English tobacco water, and then made up to 7 gallons, by the same tobacco water.

6. Add one pound of soap, to 12 gallons of strong soap suds, from the wash house, or, in case of suds not being at hand, 6 gallons of soft water to one pound of soap.

7. Add one pound of soap to 8 gallons of soft water; 2 gallons of tobacco water may be added if it can be readily procured.

8. One pound of soap to twelve gallons of water.

9. One pound of soap to sixteen gallons of water.

10. A portion of lime from the kiln must be slacked by just as much water as will make the whole fall or dissolve into dust. This, if kept dry and covered close up from air, will retain its efficacy for any length of time.

11. To one gallon of soap suds add four quarts of gas water, or in place of the latter two quarts of gas tar; either will do, as the only use of the mixture is to create an offensive smell.

12. To a quantity of fresh cow dung, say a bushel, add half a peck of slacked lime, 4 quarts gas tar, or in place of tar, half a peck of soot: but if tar can be procured it is much preferable, on account of its offensive smell; make it to the consistency of thin paint, with soap suds and four pints of the dregs of fish oil.

13. Add one peck of quick lime dust to 40 gallons of water. It may be used after standing ten or fifteen minutes, with occasionally stirring. When it is necessary to keep plants free of the dregs of lime, the lime may be left at the bottom of the vessel, but it has a better effect to stir the whole together before it is applied.

14. Quick lime three-quarters, and one-quarter soot, to be mixed well together.

15. To a full quart of quick lime add 10 gallons of water, or half a peck to 40 gallons; let it stand for 10 minutes or any longer time, and be occasionally stirred up just before it is wanted for use; when settled, draw it off pretty clear. In cases where the lime will not prove a nuisance, it will be better to mix a portion of the lime and water together.

16. Compost for Wounds in Trees.—One bushel of tenacious clay, half a bushel of fresh cow dung, let them be well tempered together to the consistency of common mortar, with the assistance of suds, from the washhouse, and 4 pints of the dregs of fish, lineseed, or any other kind of oil, or in place of the oil, a peck of tallow or kitchen fat may be used.

For wounds in the smaller branches it will require an additional quantity of suds to bring the compost to the state of moderately stiff paint, or as stiff as it can be applied with a painter's brush.

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